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ABSTRACT

Based on data collected from agriculture teachers, business firms, and employees throughout the state of California, this study sought to: (1) determine the current status of education in agriculture, (2) identify the current need for employees in agriculture, (3) develop estimates of future needs for employees in agriculture, (4) identify current, emerging, and future competencies needed by workers in agriculture, (5) develop guidelines to determine current, emerging, and future curricular needs, and (6) develop criteria to determine where public instruction in agriculture should be located, and what emphasis is needed. Among the conclusions of the study are: (1) Number of jobs requiring agriculture skills and competencies will increase in the next five years, (2) The largest increase in jobs is in the category of manager, supervisor, and foreman, and (3) Educators should review their programs to insure that they are designed to meet the requirements of existing jobs. The guidelines for curriculum development were prepared with the assumption that there is a need to avoid unnecessary duplication of effort at the various levels. The appendix includes the data collection instruments. (JS)

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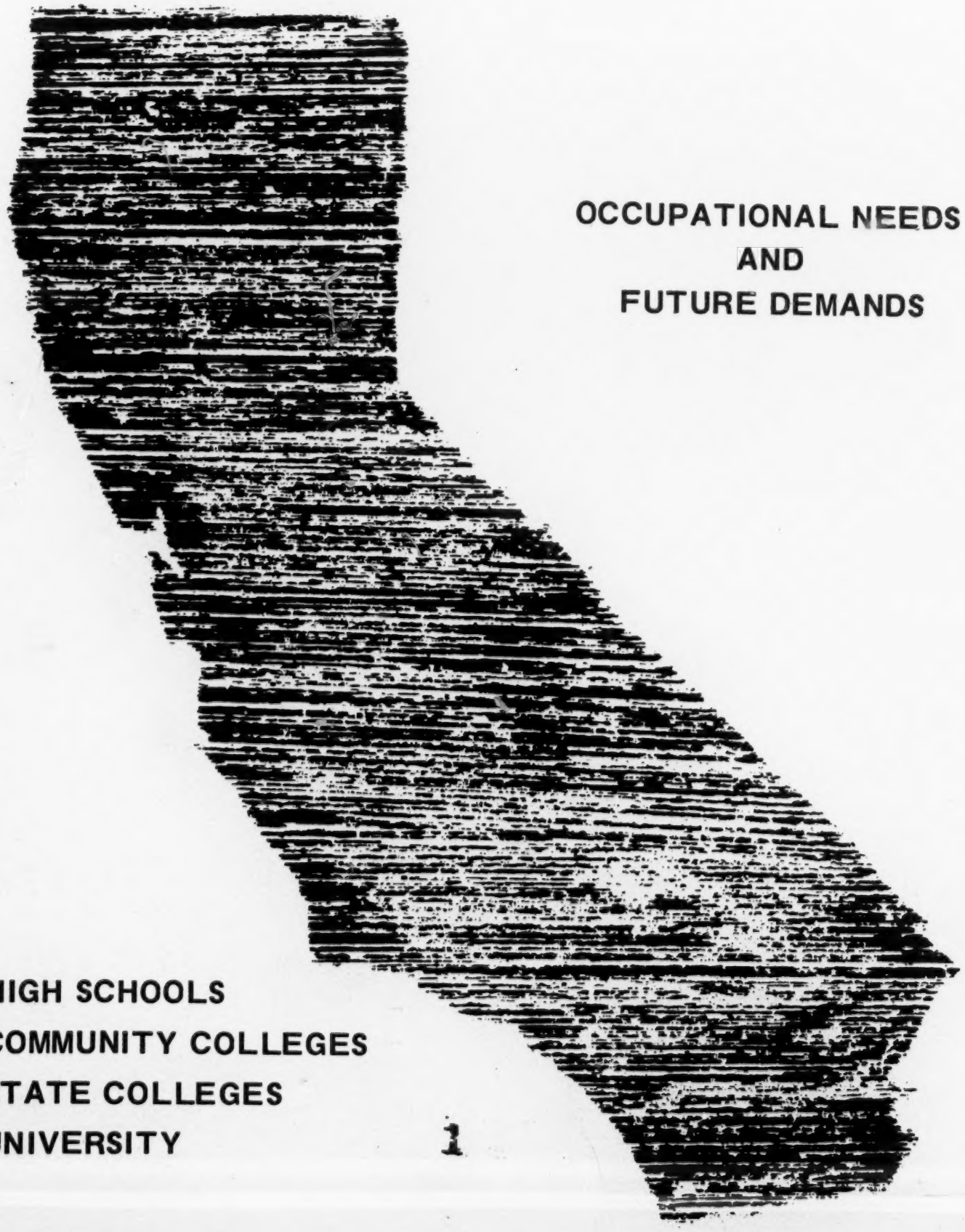
EDUCATION IN AGRICULTURE IN CALIFORNIA



OCCUPATIONAL NEEDS AND FUTURE DEMANDS

HIGH SCHOOLS
COMMUNITY COLLEGES
STATE COLLEGES
UNIVERSITY

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A Research Report

Project No. 6-1618
Grant No. 1-7-01618-5244

The Determination of Proper Allocation of Functions and Responsibilities of Institutions Providing Education in Agriculture

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Chapter I

Introduction

An in-depth study is clearly needed of the entire educational system, public and private, vocational and nonvocational, elementary, secondary, and college. The need requires little documentation; society is awakening to the fact that there are capable students who have not learned to read, that there are jobs without people prepared to take them, and that the universal intense emphasis placed upon a college education for all may be unrealistic and invalid. The disenchantment that many feel for the established system is reflected in alternative kinds of education--free schools and various experimental schools. This study is restricted to one significant part of our educational system, that dealing with agriculture.

Education in agriculture at the college level is about one hundred years old. It has been a recognized part of secondary education for about fifty years, and entered the community-college system first about twenty-five years ago. Education for agriculture has grown rapidly, and the industry which it serves has correspondingly increased in both scope and complexity. Growth and changes in the industry have been so dynamic, however, that the adequacy of the present educational system to meet its needs has been questioned. Such concern prompted this study, which was designed with the following objectives in view:

1) To determine the current status of education in agriculture.
2) To identify the current need for employees in agriculture.
3) To develop estimates of future needs for employees in agriculture.
4) To identify current, emerging, and future competencies needed by workers in agriculture.
5) To develop guidelines to determine current, emerging, and future curricula needed to prepare workers for agriculture.
6) To develop criteria to determine where public instruction in agriculture should be located, and what emphasis is needed.

The end product is a plan for education in agriculture for the state of California. Future implementation of the findings has been built into the study through close collaboration with the statewide Liaison Committee for Agriculture. This group, with representation from high schools, the community, and four-year colleges offering agriculture, had started a study of this nature but abandoned it when they joined efforts with this study.

A subcommittee of the Liaison Committee has served as an advisory group for this study since 1966, a year before the study began. That subcommittee met frequently during initiation of this study, and every six months during the past three years. Progress of the study has been reported to the Liaison Committee at its semiannual meetings.

An advisory committee of about twenty-five decision makers representing the major segments of the agricultural, industrial, and educa-

tional complex was convened to review and comment on the study proposal. Periodic progress reports have been circulated to them. This group was reconvened in May 1971 to react to the findings and conclusions of the study. Their advice and counsel were valuable in framing the study and in interpreting the findings to education and industry.

Representatives of the study have visited each of the four-year colleges, most of the community colleges, and many of the high schools to gather first-hand data. A poll of 169 teachers of agriculture in high school, community, and four-year colleges confirmed other findings that there is much optimism about the new directions taken in agriculture as programs assume broadened objectives. New challenges include recreation and environmental concerns.

The magnitude of the study and the complexity of agriculture required a variety of information-gathering sources. Interviews were conducted with owner-managers of 1,181 agricultural businesses and 4,566 employees in these firms. Questionnaires were completed by another 1,454 business concerns.

The information in this report, then, represents compilation and analysis of inputs by over 7,200 individuals, plus data from the census and numerous other sources. There is reason to believe this sample represents about 2 1/2% of the entire agricultural industry. Spot checks have been made to determine whether significant changes have occurred in the industry since our data collection started. To the extent possible, findings and conclusions have been validated by other experts in the field.

Eight panels, involving sixty leaders from various segments of agricultural business and industry, were convened to learn their needs for employees having preparation in agriculture. Their comments confirmed other data indicating that obtaining properly trained employees is a major problem of the entire agricultural complex.

A preliminary draft of the conclusions and recommendations of this report was reviewed by the industry, educational advisory committee, and the administrative committee for the study.

Obviously it is impossible to include reports on all the panels, the questionnaires, and the numerous other data-collection procedures used in this study. Reports of these activities are on file in the study center.

Chapter II

Agriculture Today

Education in agriculture as we know it today is only a half-century old. Yet in this short time it can claim at least partial credit for making possible the following statement in the Congressional Record by Congressman J. H. Quillen (Tennessee): "The American Farmer contributes a very valuable service to the people of this country, but somehow his efforts are rarely singled out for the recognition he deserves. In 1969 our farmers produced 20 percent more products on 6 percent fewer acres than in 1957. At the turn of the century, a farmer was producing enough for himself and six but in 1968 he was producing enough for himself and 42 others." It is estimated that by 1980 he will be producing for himself and 65 others.

In the latest year for which national figures are available, the marketing of farm food and fiber alone provided 5,000,000 nonfarm jobs involving a payroll and fringe benefits totaling $25 billion. Besides being a major supplier of the nation's economy, agriculture is a major customer, in the amount of approximately $50 billion a year. In 1969 California farmers spent $3.6 million to grow products for which they received $4.5 billion. The ultimate consumer paid $14.2 billion for these same products, which means that the agricultural dollar multiplies itself four times in California.

Over the past half-century, agricultural education at the secondary school has prepared millions of young men to put the latest scientific knowledge to use on American farms. This education has further given the student the scientific background necessary to continue his education with the agricultural extension service and through other media. Agricultural education at the community and state college or university has also prepared thousands for farming. Many other graduates have gone into careers involving research and dissemination of knowledge. The sum total of this tremendous educational effort in agriculture has been a major factor in creating the American farmer of today, as eulogized by Congressman Quillen.

The past century has seen this nation move from an agrarian economy to one with an industrial base. During this period California has changed from an unproductive area to one which produces one fourth of the food supply in the United States, primarily through the ingenuity of the agricultural scientist and the introduction of crop irrigation. Farming across the nation has moved rapidly from subsistence units toward multi-thousand-acre commercial (often corporate) food-and-fiber plantings worked by mechanical monsters that change the contour of the land, prepare seed beds, plant, thin, cultivate, and harvest the crops. The use of chemicals has advanced from paris green, applied on potatoes by a brush, to applications, often by air, that fertilize, defoliate, sterilize, or control plant insects or fungi. Seemingly endless changes

have occurred--from windmill to high-horsepower electric pumps, from horseback to piggy back, from ice wagons to refrigerated trucks or bulk containers, from bulk raw produce to ready-to-eat attractively packaged foods. All have become reality through education and research in agriculture.

Education in agriculture has made both urbanization and mechanization possible. Through application of new technology, farming has been able to release nearly a million workers annually to man the machines of urban industry. Most of the heavy work and drudgery is now done by machine. Increased farm efficiency and specialization are reflected in the latest available U.S. Bureau of Census figures, which show that the farm population, expressed as a percentage of total U.S. population, has dropped from 8.7% in 1960 to 5.1% in 1969.

With change comes the need for clarification of just what agriculture is. Webster shows that "agriculture" is derived from ager (field) and cultura (cultivation), and defines agriculture as "the science and art of cultivating the soil, producing crops and raising livestock." Farming, a synonym, is "to practice agriculture."

Far too many people continue to think of agriculture as farming, and even Webster's definition of farming is inadequate. While farming "is the practice of agriculture," it is much more. It now involves a high level of management skill in the procurement and use of a wide variety of goods and services, including capital, labor, chemicals, machinery, and consultants--not to mention the management skills that are essential in marketing.

A transition term now in common usage is "production agriculture," which implies that there may be more than one kind of agriculture. Does this term mean "farming"? If so, production agriculture must also mean more than farming. Production agriculture is farming plus a host of recently created on-farm and off-farm inputs, as suggested in the preceding paragraph.

"Agribusiness," a term coined during World War II, also involves agriculture. It encompasses the commercial-industrial components in the functions of production, assembly, processing, manufacture, and distribution of new products from raw materials derived wholly or in part from livestock and crops, with or without the addition of other products. Other new products in "agribusiness" include the substitutes. And still a major component of "agribusiness" is the handling of raw food, ornamental, and fiber products themselves, including all the inputs of the private sector from point of origin to point of consumption. Much of what now comes under "agribusiness" was done on the farm when Webster's definition of agriculture was written. Possibly the best available criterion is as follows: if knowledge and skills normally considered agricultural are essential in operation of a company, then it is considered agribusiness.

Agriculture has recently come into a broader public spectrum simultaneously in two new aspects. Some view agriculture as a monstrous

contributor to pollution, not only through residues of fertilizers and pesticides but also from waste by-products of agriculture, such as objectionable odors, manures, and smoke from burning of crop residues. Some individuals also see agriculture, and farming in particular, as having been responsible for the severe economic hardships of many minority people. Thus agriculture has become increasingly involved in the socio-economic and political arena. The sum total has contributed to detriment of the public image of the industry. In the process, agriculture has lost some political power.

Characteristics of Agriculture

Agriculture today must be viewed not with only the local picture in mind. Nationally the assets of agriculture total nearly $300 billion --equal to about two-thirds of the assets of all corporation stocks on the New York Stock Exchange. This industry of agriculture employs over five million workers, more than the combined employment in transport, public utilities, the steel industry, and the automobile industry. It plays a major role in world trade, grossing more than 7 billion dollars. This world market takes produce from about one crop acre in four. Thus, agriculture remains the nation's greatest and most basic industry. California accounts for about 10% of the national agricultural output, making it easily the nation's number one farm state. It ranks first in the nation in the production of 44 crops; among these it grows over 90% of the almonds, apricots, artichokes, dates, figs, grapes, nectarines, olives, and walnuts. Over 40% of the nation's vegetables, fruits, and nuts originate in California, while beef, dairy products, and poultry combined account for nearly one-third of the state's agricultural income (over four billion dollars annually). Grapes are the top field commodity in dollar value, followed by hay, tomatoes, cotton, lettuce, and nursery products. California's leading export products are cotton, oranges, rice, grapes, and canned and dried fruits. Exports addabout one-half billion annually to California's agricultural income.

Such agriculture must be continually dynamic to keep abreast of changes in markets, food preferences, and new technology. Historically, California farmers have led the nation in implementing mechanization and new technology, a condition made possible by strong education and research programs in agriculture.

In planning for the decades ahead, educators, agriculturists, and others must be ever-mindful of the local and national trends, some of which may not follow a normal course but change abruptly because of breakthroughs in technology.

Trends in Agriculture

Through improved efficiency, agriculture has provided an inexpensive food supply within the means of most of our population. As a result, people now can spend over 80% of their incomes on nonfood items. The increase in efficiency has resulted from many factors. For example, during the past fifty years, farm-labor production per man hour has increased six times. Yield per crop acre has increased 80%, and the output per breeding animal has doubled. During the 1960's, productivity

per farm worker increased 6% per year, double the increase of worker productivity in nonagricultural industries. Obviously, then, the number one trend in agriculture across the nation--and in California in particular--is an increase in efficiency of production, for man, for animal, and for the land. New technology and education have made this possible. A result is a change in the numbers and sizes of farms in California, while total acres in production have remained relatively constant (Table I). Obviously, the small farm of less than 100 acres is disappearing the most rapidly, while there is a decrease in the numbers of farms in all size categories. An obvious conclusion is that while the number of farms of over 1,000 acres decreases, the average size of these units has increased. This was confirmed by discussions with farmers and representatives of lending agencies.

TABLE I

TRENDS IN THE SIZES AND NUMBERS OF CALIFORNIA FARMS

Size of Farm (Acres)	1950		1959		1964		1970*		1971*	
	Number	Acres	Number	Acres	Number	Acres	Number	Acres	Number	Acres
1-99	104,419	2,423,396	70,350	1,741,112	55,218	1,451,115				
100-499	21,757	4,760,326	18,419	4,113,232	15,802	3,566,978				
500-999	4,853	3,403,134	4,451	3,122,504	4,096	2,869,472				
1000+	6,001	25,498,808	6,012	27,877,003	5,736	29,123,360				
Total Land in Farms		36,085,644		36,853,851		37,010,925		36,800,000		36,600,000
Average (Acres/Farm)		263		371		458		634		654
Total Number of Farms		137,030		99,232		80,852		58,000		56,000

Source: U. S. Census of Agriculture 1964.
(years 1950,1959, and 1964)

* Figures for 1970 and 1971 are estimates only, made by Field Crop Section, California Bureau of Agricultural Statistics. (U. S. Bureau of Census 1970 figures not yet available)

A second major trend is in the role of capital in agriculture. One possible indicator of this is the change in farm ownership over the past two decades (Table 2). The decrease of nearly one half in the number of farm owners and tenant farmers in a fifteen-year period suggests the financial plight of agriculture, accelerating even more rapidly since the 1964 census. Contributing to the financial crisis has been the economic environment in which farmers operate: costs of production, including taxes, wages, machinery, and interest rates, have increased steadily while the sale price of agricultural products has remained constant (in most instances) or declined. The result is that, even with increases in efficiency, many farmers are being forced out of business by economic pressures. An astounding number of large California farms which appear prosperous on the surface are being operated under provisions of Chapter 11 of the bankruptcy laws. Unconfirmed reports place the proportion of farms in this financial situation at as high as 20% in the central area of the state, with many of these being larger farming operations.

TABLE 2

FARM OWNERSHIP IN CALIFORNIA

Type	1950		1959		1964	
	Number	Acres	Number	Acres	Number	Acres
Full Owner	100,834	11,335,525	68,489	9,386,908	53,218	7,595,151
Part Owner	17,478	14,813,873	17,756	19,006,203	15,818	18,812,834
Managers	2,556	5,910,775	2,144	4,309,447	2,149	5,905,879
Tenants						
Cash	7,511	2,461,795	5,125	2,403,038	5,083	2,931,655
Share - Cash	972	472,040	912	447,227	976	534,096
Share	4,282	1,022,099	2,626	842,850	1,873	651,044
Other	3,535	597,184	2,180	458,178	1,735	580,266
Totals	137,168	36,613,291	99,232	36,853,851	80,852	37,010,925

Source: U.S. Census of Agriculture, 1964.

Further changes in the role of capital in agriculture are brought about by investment in land as a hedge against inflation and source of long-term capital gains. A further force is the tax advantages that investors are seeking. These investors, which include insurance companies, oil interests manufacturing concerns, and various conglomerates, generally have brokers who put several farming or ranching operations together. Some have definite plans for large plantings of tree crops; others are planning for future residential or recreational development; and the intent of others is not clearly known. The present farmer with limited access to outside capital and credit finds it increasingly hard to compete with units having not only abundant capital but often an industrial approach to management--an approach that is foreign to the agricultural sector. A case in point is an attempted revolutionary change in the pricing of lettuce brought about by a large industrial concern in the Imperial Valley during the last year.

A third major trend in California agriculture is that of diversity of production. The traditional "corn-hog" economy of the Midwest is not typical of California. The alternatives, particularly in the valley agriculture, include some two hundred commercial crops, ranging from food spices to rice. While growing conditions place certain limitations on the selection of crops to be grown, in many instances the decision on choice of crop is primarily that of economics--which crop promises the highest net return. Thus, the risk factor is increased and management skills must be broad. The ability of the farmer to select the best economic alternative may dictate his survival in farming. New technology and socio-economic considerations now enter the decision-making arenas. Not the least among these is the unrest in farm labor forces. Also influencing the crops which will be grown are competition from food substitutes and trends in food preference.

Tentative crop projections in California agriculture through 1980 reflect the trends suggested above (Table 3). For example, little total change is anticipated in field crops in the next decade, whereas both fruit and nut crops and vegetables are expected to increase by one-fifth. Changes in individual commodities, however, are expected to be considerable. These changes range from a 75% increase in nut crops (tree) to a reduction of 22% in wheat. Projections for livestock through 1980 show an anticipated increase in dairy, beef, and poultry, with decline in sheep and hogs (Table 4). These projections must depend critically on the development of production in competing areas during the decade.

A fourth trend is for agriculture to become more involved in producing nonfood or nonfiber crops and in performing functions not considered a part of farming or agriculture a decade ago. Among these new activities is the multiple use of agricultural lands for recreational pursuits.

The State Planning Office, in its "California State Development Plan Program" in 1968, stated that: "As a result of population growth and large-scale urbanization, recreation has become essential to the mental and physical well-being of the people and has become a vital force in the culture and economy of the state." Outdoor recreation is

TABLE 3

Crop Projections, California Agriculture, 1980,
With Comparisons to the 1961-1965 Average

Crop category	1961-1965 average acreage*	1980 projected acreage	Change in acreage 1961-1965 to 1980
	1,000 acres		percent
Field crops:			
Feed grains	1,924	1,898	- 1
Rice	318	288	- 9
Wheat	301	234	-22
Alfalfa	1,161	1,151	- 1
Cotton	765	838	10
Sugar beets	286	325	14
Dry beans	217	215	- 1
Potatoes	101	94	- 7
Misc. field crops	1,208	1,290	7
TOTAL	6,282	6,333	1
Fruits, nuts, and grapes:			
Deciduous fruit	396	443	12
Citrus fruit	241	325	35
Semi-tropical fruit	81	84	4
Tree nuts	288	505	75
Grapes	479	461	- 4
TOTAL	1,485	1,818	22
Vegetables:			
Tomatoes, processing	144	160	11
Tomatoes, fresh	34	38	12
Dark green and yellow	63	84	33
Other principal vegetables	328	416	27
Melons	73	86	18
Misc., including strawberries	51	49	- 4
TOTAL	693	833	20
Total harvested crop acres:	8,460	8,984	6

*Individual acreages may not add exactly to totals because of rounding error.

Source: G. W. Dean and G. A. King, "Projections of California Agriculture 1980 and 2000", Gianini Foundation Research Department, No. 312, University of California, Davis, 1970.

TABLE 4

Livestock Projections, California Agriculture, 1980
With Comparisons to the 1961-1965 Average

Livestock category	1961-1955 average numbers	1980 projected numbers
Dairy cows: cows and heifers over 2 years	877,000	956,000
Beef cattle: fed in feedlots	1,957,000	2,500,000
Sheep: lives 1 year and over	1,293,000	1,150,000
Hogs: pigs saved	308,000	250,000
Poultry: layers, annual average	29,943,000	35,835,000
broilers produced	60,115,000	67,520,000
turkey raised	16,386,000	26,254,000

Source: G. W. Dean and G. A. King, "Projections of California Agriculture 1980 and 2000", Gianini Foundation Research Department, No. 312 University of California, Davis, 1970.

further characterized as a "human need" and a "basic right." The demand for outdoor recreation provides new opportunities for agriculture and farmers. Although one half of California is publicly owned, most of the land close to population centers is private holdings. Thus, much of the land that is suitable and accessible for recreational use is in private hands. As early as 1963, about one thousand California farms reported gross recreation incomes totaling over four million. About one fourth of these reported recreation incomes of over $2,000 from fishing, hunting, and other services.

Enterprises involving either new or multiple uses of agricultural lands for recreation include deer, pheasant, duck, and fishing clubs, pheasant raising, trout, catfish or bass farms, riding stables, fur farms, camp and picnic grounds, vacation farms, and snow-sport areas. It is estimated that California sportsmen spend over 700 million dollars each year on hunting and fishing. Current rates range from $75 to $500 per blind per year for waterfowl clubs, $275-350 for 40 birds for pheasant clubs, and $50-200 per year for deer clubs. Thus, landowners can supplement incomes by providing some form of outdoor recreation for the two million fishermen and half million hunters in California. Overall demand for outdoor recreation in 1980 is expected to double that of the 1960's. Financial and/or technical assistance in obtaining, developing, and preserving open space for recreation can be obtained from public agencies such as Federal Land and Water Conservation Act of 1965, Farmers Home Administration, Small Business Administration, U.S. Soil Conservation Service, and U.S. Forest Service, to name a few.

The production of nonfood nonfiber crops has long been a part of California agriculture but only recently has become recognized as an important segment of the agricultural economy. With urbanization and industrial development have come housing developments and freeways, all

of which have led to a tremendous demand for trees, shrubs, turfs, bedding plants, and other ornamentals to beautify the surroundings. Production of plant materials has become big business. Eleven California counties reported wholesale values of ornamental horticulture of over five million in 1969 (Table 5). This has created the need for hundreds of retail outlets in garden centers and nurseries. Other businesses created by this industry include companies which specialize in landscape design, landscape construction, turf and landscape maintenance, sprinkler systems, and tools and power equipment, for both commercial and home lawn maintenance.

TABLE 5

Counties With Wholesale Value of Ornamental Horticulture Production of Over $5,000,000 in 1969*

County by rank	Total wholesale value ($1,000)	Non-ornamental value included* ($1,000)
1. Los Angeles	40,293	1,095
2. San Mateo	23,511	0
3. San Diego	20,772	846
4. Orange	16,727	233
5. Alameda	16,710	36
6. Santa Clara	16,450	77
7. Santa Barbara	9,174	13
8. Monterey	9,117	0
9. Ventura	6,180	2,037
10. Kern	6,023	314
11. Santa Cruz	5,320	0

*Includes seedling vegetable plants, and strawberry plant starters.

**Compiled by Agricultural Extension Service, University of California, Davis, 1970.

California ornamental plant production in the past four years alone grew by 20%--from a wholesale value of 175 million to over 210 million (Table 6). Cut flowers, trees, and shrubs had the greatest dollar growth during this period (1966 to 1969).

By far the leading county in the production of ornamentals is Los Angeles, with a wholesale production of over 40 million dollars in 1969. Other leading counties, except for Kern, tend to be coastal and

TABLE 6

California Ornamental Plant Production 1966-1969*

Category	1966 ($1,000)	1967 ($1,000)	1968 ($1,000)	1969 ($1,000)
Cut Flowers	$ 59,463	$ 62,463	$ 70,352	$ 79,495
Trees and Shrubs	45,724	45,935	51,073	59,343
Potted Plants	16,597	16,542	17,104	17,846
Bedding Plants	7,553	6,812	7,217	8,524
Bulb Production	5,663	2,745	2,760	3,080
Rose Plants	4,503	6,047	6,623	7,164
Propagative Materials	3,256	6,062	4,226	4,002
Flower Seed Production	2,823	1,612	2,394	2,095
Herbaceous Plants	2,446	1,611	2,341	1,844
Misc. plus Turf Seed and Sod	2,400	2,118	3,727	4,108
Xmas Trees				2,361
Total Ornamentals	150,415	151,967	167,822	189,724
Nursery Other Than Ornamentals	23,945	20,205	19,931	20,931
Annual Total	174,361	172,172	187,753	210,656

*Farm Gate Values - compiled by Agricultural Extension Service, University of California, Davis, 1970.

adjacent to large population centers. Production areas are expected to change, though, particularly if smog near the population centers increases and competition for land continues to climb.

With population increases and increases in man's leisure time, turf production on golf courses and other recreation areas has become a thriving industry which is in need of trained maintenance personnel. Increasing recognition of need for employees trained in ornamental horticulture and landscapes is reflected in the growth in programs in these areas in secondary schools and community and four-year colleges and universities.

There appears to be no limit in demand for plant materials and accompanying services for ornamental horticulture as urbanization, industrialization, and outdoor recreation continue to expand.

As the agricultural educator looks to the future he must plan curricula and programs with the following trends firmly in focus. All education faces the challenge of increased efficiency. Education in agriculture, to remain in competition for resources, must critically review its offerings--continually adding what is new and discarding wha what is no longer needed. The industry and business of farming and agriculture are dynamic enterprises, and farming in particular faces the following trends:

-- Production units will increase in size.
-- Extensive marketing changes will continue, possibly at an accelerated pace.
-- Capital needs will increase, and availability of capital will remain limited.
-- Substitution of capital for labor will continue as technology moves forward.
-- Operating costs for services, machinery, taxes, supplies, and labor will continue to increase.
-- Increases in prices for farm commodities will probably continue to lag behind increases in cost of production.
-- Skill level needed by employees in agriculture and farming will continue to rise with mechanization.
-- Farm ownership by individuals or families will tend to give way to corporate conglomerate groups.
-- Agriculture and farming will receive increasing criticism for its role in pollution of the environment. Control measures may have a substantial effect upon enterprises in which farmers will engage.
-- Multiple use of agricultural lands for recreation and other purposes will increase.
-- Specialty nonfiber nonfood crops, including ornamentals, will continue to play a greater role in agricultural production.

Chapter III

Education Today

This study, by an intensive look at the educational needs of workers in agriculture, both present and future, hopes to provide educators with the kind of information they need to make curriculum decisions. By identifying jobs in agriculture which are becoming obsolete and those which are emerging, this study will help educators keep programs relevant and at the same time possibly reduce costs.

The unique educational needs of the agricultural sector were recognized by the Morrill Act of 1862, which established a Land-Grant college in each of the states. These four-year institutions, later supplemented with funds for research in agriculture (Hatch Act 1888), gave primary emphasis to teaching in agriculture and mechanical arts. Today, a century later, these institutions are still an important part of the nationwide public system of higher education. These Land-Grant colleges have helped create a national capacity for food production that is second to none.

Need for implementation of the findings of research in agriculture prompted the Smith-Lever Act of 1914. This legislation established the Agricultural Extension Service, with specialists in agriculture and home economics in practically every county in every state. Their major charge has been to work with adult farmers. The Smith-Lever Act was followed three years later by the Smith-Hughes Act, in response to the need for training individuals for American industries. The intent was to promote vocational education at the secondary-school level in agriculture, trades and industry, and home economics.

The initial grant, of some seven million dollars, was followed during the ensuing half century by a series of acts which supplemented the original appropriation. The Smith-Hughes Act set the framework for public vocational education, which has persisted basically unchanged for nearly a half-century. After several years of study, Congress passed the Vocational Education Act of 1963, which, with companion amendments in 1968, is a second landmark in vocational education. The following summary of the two basic acts appears in the Arthur D. Little Study of Vocational Education in California, 1969:

"VEA 63 set a goal of providing some form of vocational education for all groups of students, so that whenever and for whatever reason they may leave school they would do so with a marketable skill and realistic sense of the world of work, and so that vocational education would be established as a permanent resource for all out-of-school adults seeking to change or upgrade their work.

"VEA 68, based on the recommendations of the National Advisory Council on Vocational Education, carried the philosophy a step further by calling for a break-down of existing subject matter barriers. Vocational education was redirected from seven selected occupational

categories to preparing all groups for work, and vocational education was again directed to be responsive to the urgent needs of persons with special needs, that is, those with special difficulties preventing success in regular programs."

The combination of broadened objectives and increased federal support has become a potent catalyst in all vocational education. Federal support for vocational education in California has increased from a few million per year to over thirty million in 1971. During the decade of the 50's and until 1965, the number of secondary schools offering agriculture, the number of teachers, and enrollments in agriculture remained relatively constant (Table 7). With the new legislation the number of secondary schools offering agriculture increased to 272 by 1970 from a ten-year average of about 230. This growth was accompanied in the past eight years by an increase in enrollment from about 14,000 to more than double that number. Also the average number of agriculture students per department increased from about sixty prior to 1963 to over one hundred today.

TABLE 7

High School Enrollment in Vocational Agriculture, California*
(1958-1970)

Year	Number of departments	Enrollment**
1958-59	234	13,827
1959-60	233	13,701
1960-61	230	13,463
1961-62	229	13,904
1962-63	224	14,219
1963-64	227	15,429
1964-65	230	16,837
1965-66	232	18,009
1966-67	240	20,197
1967-68	265	20,900
1968-69	268	25,041
1969-70	272	28,558
1970-71	275	31,928

* Source: Bureau of Agriculture Education
State Department of Education

** Enrollment figures prior to 1967-68 include community-college students.

During this same period, instruction, which was formerly concerned exclusively with production farming, now encompasses all of agriculture, including preparation in agricultural business, ornamental horticulture, forestry, agricultural mechanics, and natural-resource development (Table 8). While production agriculture remains the dominant program, trends suggest that expansion is primarily in the new program areas.

TABLE 8

High-School Enrollments in Vocational Agriculture Course Groupings *

Instructional program	Fall 1968-69			Fall 1969-70		
	Male	Female	Total	Male	Female	Total
Agricultural production	13,965	1,702	15,727	13,533	2,525	16,058
Agricultural supplies	38		38	184	11	195
Agricultural mechanics	3,943	86	4,029	5,880	308	6,188
Agricultural products	56	2	58	91	50	141
Ornamental horticulture	2,985	628	3,613	3,175	1,071	4,246
Agricultural resources	197	24	221	382	78	460
Forestry	775	26	801	582	18	600
Agriculture, other	525	29	554	540	130	856
Totals	22,484	2,557	25,041	24,367	4,191	28,558

* Source: Bureau of Agricultural Education, California Department of Education, Student Enrollment Recap.

Instruction in agriculture, now offered in thirty-six community colleges (up from sixteen in 1963), has likewise experienced unprecedented growth (Table 9). Enrollment in agriculture increased from slightly less than 2,000 to over 6,300 during this period. Offerings in agriculture in community colleges range from a few courses and one instructor, in one college, to the largest program, which offers 71 courses in 17 majors by a teaching faculty of 19. In the latter institution, traditional majors in production agriculture are supplemented with technical preparation in exciting new majors in recreational land management, fluid power mechanics, artificial insemination, park maintenance, and agricultural laboratories technician. Ornamental horticulture, the most common agricultural major in the community college, is offered in two-thirds of the institutions, and accounts for about one-fifth of the students in agriculture. The production-agriculture major, which as the single largest group of students (one in four), is

TABLE 9

Agricultural Enrollments in Community Colleges *
1965-1970

School year	Total agricultural enrollment	Number of community colleges offering agriculture
1965-66	3,896	27
1966-67	3,886	33
1967-68	3,953	34
1968-69	4,601	36
1969-70	6,366	36

* Source: Directory of California Community Colleges Providing Agriculture—Forestry Education and Reports from Bureau of Agricultural Education, State Department of Education.

offered by only one third of the colleges (Table 10). The increases in enrollments and in majors in the community colleges are primarily in areas that are nonproduction-oriented. Production orientation, which still dominates the high-school program (56% of the enrollees), is losing ground especially in community colleges which have recently established programs in agriculture.

The high-school programs are a major source of agriculture students for the community-college programs, which, in turn, are major suppliers of students of agriculture in the four-year institutions. In addition to preparing individuals for advanced study in agriculture, community colleges train many individuals for the newly emerging technician positions in agriculture and related industries (Table 11).

Expansion of the state-college system has been tremendous--from seven to nineteen institutions since World War II, with a twenty-fold increase in enrollment. Agriculture in these institutions has not increased proportionately. Instruction in agriculture course majors is given on State College campuses at Chico, Fresno, Pomona, and San Luis Obispo. Table 12 shows that each state college offers breadth in agricultural courses. Yet each appears to have area(s) of emphasis. Judged by course offerings alone, one finds the emphasis

TABLE 10

Enrollments in Agriculture in California Community Colleges *
(By Majors)

Curriculums in agriculture offered in California community colleges (1968-69)	Community colleges offering the curriculum	Proportion of 4,601 students in agriculture in each curriculum
Areas	Number	%
Agribusiness	14	9.4
Agricultural mechanics	11	5.9
Ag processing	1	0.5
Agricultural production	12	25.6
Agricultural resources	2	0.9
Ag sales and services	1	0.2
Animal science	2	3.1
Crops production	4	2.0
Floral design and flower shop management	1	3.2
Forestry	13	16.6
Laboratory animal technician	2	2.0
Landscape maintenance	3	1.7
Natural resources	5	4.5
Ornamental horticulture	21	21.3
Park and recreation	1	0.3
Pre-landscape architecture	1	0.2
Pre-landscape contracting	1	0.3
Retail nursery management	2	1.9

* Source: Directory of California Community Colleges.

TABLE 11

Agricultural Course Enrollment in California Community Colleges *
(Fall 1969-70)

Course titles	Colleges offering	Student enrollment
Agribusiness	18	436
Agricultural enginnering	1	13
Agricultural engineering and mechanics	3	88
Agricultural inspection	1	8
Agricultural mechanics	6	137
Agricultural processing	1	21
Agricultural production	14	1085
Agricultural resources	2	52
Agricultural sales and services	1	12
Animal production	1	44
Animal science	3	103
Farm machinery	1	2
Forestry	12	567
Forestry technician	2	87
Forestry and wildlife	1	46
Floral design and floral shop management	1	30
Laboratory animal technician	1	40
Landscape maintenance	3	96
Mechanized agriculture	1	2
Natural resources	5	292
Ornamental horticulture	21	588
Parks and recreation	1	15
Plant production	1	40
Plant science-crop production	1	48
Plant science-crop production and inspection	1	12
Retail nursery management	2	99
Small animals	1	49

* 36 community colleges with agricultural course enrollment totaling 6,366 students (5,254 male, 1,112 female).

Source: Directory of California Community Colleges Providing Agricultural Forestry Education

TABLE 12

Agricultural Course Offerings in California State Colleges *
1969-70

Areas	Chico State	Cal Poly S.L.O.	Cal Poly Pomona	Fresno State
Agricultural business management	5	60	26	8
Agricultural education		10		5
Agricultural engineering	10	78	16	16
Animal science	29	51	39	38
Conservation		3		
Foods and nutrition		21		11
International agriculture			8	
Landscape architecture and ornamental horticulture	14	32	31	8
Natural resources management		12		
Plant science	14	47	58	50
Poultry industry		19	3	5
Soil science	7	11	13	
Veterinary science		6	3	
Related agriculture	5		3	
Totals	84	350	200	141

* Source: General Catalogs of Individual Schools List of Course Descriptions.

in animal science at Chico,, in plant science at Fresno and Pomona, and in animal science, agricultural management, ornamental horticulture, and agricultural engineering and mechanized agriculture at San Luis Obispo. Obviously, local needs and the age of the particular program influence the degree of specialization at any one institution.

Since 1963, undergraduate agricultural majors in those four colleges have increased by about 10%, while programs in the junior colleges and high schools have doubled during the same period (Table 13). Statistics on majors related to natural resources in the five colleges offering these programs in 1969 show growth trends similar to those in community colleges. Obviously, Humboldt State College, with an established program in forestry, dominates these statistics (Table 14).

The four colleges offering agriculture share a similar philosophy of education in agriculture. Each stresses a problem-solving approach

TABLE 13

Enrollment Trends in Agriculture in California State Colleges *
(Majors Only)

	1963	1964	1965	1966	1967	1968	1969
Total state colleges	2582	2737	2342	2292	2529	2700	2871
Undergrad	2582	2737	2342	2287	2504	2674	2820
Grad				5	25	26	51
Chico State	250	298	262	256	360	291	262
Undergrad	250	298	262	256	360	291	262
Grad							
Fresno State	443	504	423	436	480	561	577
Undergrad	443	504	423	431	455	535	534
Grad				5	25	26	43
Cal Poly, SLO	1394	1448	1139	1090	1199	1318	1471
Undergrad	1394	1448	1139	1090	1199	1318	1463
Grad							8
Cal Poly, Pomona	495	487	518	510	490	530	561
Undergrad	495	487	518	510	490	530	561
Grad							

* Source: State College Board of Trustees
Institutional Research, August 5, 1970.

TABLE 14

Enrollment Trends in California State Colleges Offering Natural Resources *
(Majors Only)

	1963	1964	1965	1966	1967	1968	1969
Total state colleges	618	730	825	953	1081	1140	1397
Undergrad	592	698	791	904	1022	1097	1327
Grad	26	32	34	49	59	43	50
Humboldt State (Natural resources)	553	655	748	850	969	935	1103
Undergrad	527	623	714	801	910	892	1053
Grad	26	32	34	49	59	43	50
San Jose State (Conservation)	38	40	38	43	40	46	45
Undergrad	38	40	38	43	40	46	45
Grad							
Sacramento State (Environmental resources)	27	35	39	60	66	93	87
Undergrad	27	35	39	60	66	93	87
Grad							
Cal Poly, Pomona (Parks administration)					6	45	55
Undergrad					6	45	55
Grad							
Cal Poly, SLO (Natural resource management)						21	87
Undergrad						21	87
Grad							

* Source: Registrar's Office of individual campuses.

in teaching agriculture. Their graduates are in demand by employers seeking individuals with expertise in production and management of farming and/or agricultural enterprises. Many students use their preparation in agriculture as a stepping stone for entry into graduate study. On-campus preparation includes opportunity for experience in the farm laboratory operated in conjunction with each of the agricultural departments. Graduate education in agriculture at the master's level has been started on a limited scale on each of the four campuses.

The teaching of agriculture in the University of California system dates to the Morrill Act of 1862. Agricultural instruction started on the Berkeley campus in 1868, and has since been extended to campuses at Davis, Los Angeles, and Riverside. The Regents of the University have decreed that the major emphasis in agriculture in the University will be on the Davis campus. Instruction in agriculture was discontinued at Los Angeles when a program was initiated at nearby Riverside. Agriculture, particularly at the undergraduate level in the university, attracts a very minor portion of the student body (as in the state college) and has shown only a modest increase in the past ten years. Practically all the increase has been on the Davis campus (Table 15). Graduate enrollment nearly equals that of undergraduates. Areas of emphasis in agriculture are less broad in the university system than in state colleges, except in the College of Agricultural and Environmental Science at Davis. This college has rather extensive undergraduate offerings, including resource management. Emphasis at Berkeley is mainly

TABLE 15

Enrollment Trends in Agriculture at University Level *

		1963	1964	1965	1966	1967	1968	1969	1970
Berkeley		583	479	572	466	549	613	614	
	Undergrad	261	297	349	320	353	289	261	
	Grad	326	182	223	146	196	324	353	
Davis		1156	1317	1425	1510	1482	1501	1710	1914
	Undergrad	644	736	792	853	838	878	1060	1321
	Grad	512	581	633	657	644	623	650	593
Los Angeles		63	70	49	104	66			
	Undergrad	18	25	8	4	2			
	Grad	45	45	41	100	64			
Riverside		127	34	135	87	139	299	318	
	Undergrad	13	23	37	54	55	62	81	
	Grad	114	11	98	33	84	237	237	
Totals		1933	1900	2181	2167	2236	2413	2642	
	Undergrad	936	1081	1186	1231	1248	1229	1402	
	Grad	997	819	995	936	988	1184	1240	

* Source: Annual Campus Enrollment Summaries, University of California.

in agricultural economics and forestry, and at Riverside is in plant science.

The teaching program in the university typically places emphasis on research, for each professor devotes at least half of his time to research in his fields of specialization. Even so, the application phase of agriculture is neither belittled nor ignored (with opportunities for experience provided on campus as well as off campus during the summer).

THE FUTURE

Education in agriculture is on the move. The public is aware of major concerns of farming and agriculture--in most instances for the first time in history. Institutions are responding with varied degrees of enthusiasm. Federal appropriations for vocational education decree that vocational education must also be provided for those with handicaps (academic, social, economic, cultural, and other) that prevent them from succeeding in traditional programs. Agriculture in high school and community colleges is responding, though sometimes hesitantly.

The rush of the urban dweller to the beach, desert, foothills, and mountains for housing and recreation faces the agriculturist with the challenge of maintaining and enhancing the ecology of areas of multiple use. Residues of chemicals, once used liberally in agriculture, are creating unanticipated problems. Odors from decaying agricultural wastes and fumes from burning wastes are building to levels intolerable to urban dwellers, particularly in areas of urban sprawl.

Education and research in agriculture are responding. In some instances the response is a mere recognition of new challenges and demands, while the traditional emphasis remains exclusively on the production of food and fiber. In other instances the desire for change is present and awaiting direction. Where curriculum changes are made, there is immediate student response. For example, a change in emphasis to environmental concerns has doubled agricultural enrollment in one community college in one year. Another school reported an enrollment increase from 26 to over 400 the second time that a course in environmental toxicology was offered.

Education in agriculture has a vital role to play in the survival of man on this planet. It must be concerned with continued increase in the quantity of food and fiber, as well as efficiency in production. It must be concerned with recycling the wastes created by the industry and by man. It must be concerned with the social and political impact of this industry upon the local, national, and world social order. It must create a system for regenerating the energy sources now used indiscriminately by man. This study is dedicated to making contributions to those ends.

Chapter IV

Study Findings From Firms Interviewed

The decision was made early in the planning stage of the study to divide the data-gathering process into two distinct phases. The primary objective of Phase I was to identify and describe all agricultural jobs and businesses commonly found in California. Firms or businesses to be described were not only the farming businesses (herein referred to as production agriculture) but also all those various related firms (commonly referred to as agri-industry). Each individual job title that required agricultural competency was to be identified and described. The main objective of Phase II was then to take each of these job titles discovered, determine how many people are now employed in each job title, and then project the numbers of people needed in each job in the future.

Separating these two objectives made possible the gathering of two different types of data. Phase I data, being descriptive, did not require the sampling precision essential to the statistical data of Phase II. Following is a discussion of the methods used in the Phase I proceedings.

Determination of Population to be Sampled

The major sampling requirement was that the population sampled be representative of agriculture in the state. In addition, the sample had to be such that interviewing could be conducted effectively, for the type of information sought in this phase required interviews as opposed to a mailed questionnaire. Because so much of the data available are by county, it seemed logical to use the county unit as a basis for interviewing. The task then remained of deciding which counties to use, since sampling all counties did not seem feasible or necessary. Several combinations of counties were tested, using the 1964 Census of Agriculture as a source of production information. A list of 9 counties was developed by selecting the leading county in terms of on-farm income in each of the major categories of production. Table 16 shows the categories of production used, the leading county in terms of on-farm income, and the percentage of the total statewide income in each category represented by the total of the selected counties. Although Butte County did not lead in any major category, it was added to the study to give a greater degree of geographic balance and provide a sample of foothill agriculture and rice production, neither being represented by the original 9 counties.

It was felt that these 10 counties--Butte, Fresno, Humboldt, Imperial, Kern, Los Angeles, Monterey, Stanislaus, Tulare, and Ventura--would represent all phases of agriculture sufficiently for adequate descriptions of jobs and businesses.

The names and addresses of agricultural businesses are not assembled easily. The original idea was that farm addresses could be obtained

TABLE 16

Counties Used in Study Sampling

Category	Leading county	% of state income represented by 10-county total
All farm products sold	Fresno	50.0
All crops sold	Fresno	53.3
Field crops sold	Kern	56.0
Vegetable crops sold	Monterey	54.1
Fruit and nuts sold	Tulare	50.9
All livestock and poultry products sold	Imperial	45.7
Poultry and poultry products sold	Stanislaus	35.3
Dairy products sold	Los Angeles	39.8
Other livestock and livestock products sold	Imperial	36.5
Recreation income (on farm) from hunting, fishing, and other recreation	Ventura	29.8
Income from nursery and greenhouse products, plants, and flowers (on farm)	Los Angeles	34.9
On-farm sales of forestry products	Humboldt	48.1

from the local California Department of Employment Farm Labor Office, and the names of agriculture-related businesses from the yellow pages of the telephone directory. This process was tried in a small pilot project in Yolo County, and tested again on a larger scale in Stanislaus County, the initial county on the sample list. It soon became obvious, however, that the technique was too cumbersome for complete coverage of a large county. Arrangements were then made with the main office of the California Department of Employment in Sacramento for a complete listing of all farming and agro-industry businesses in California, by county, in selected Standard Industrial Classifications (SIC). Table 17 is a complete listing and description of the SIC's selected. Even this listing may not be absolutely complete. Since the names are those who have reported employees for Disability Insurance purposes (in the case of farms) by quarter of the year, a firm not employing any personnel in a given quarter might not be listed. Selected as the quarter containing the largest number of agricultural employers was the third quarter (July, August, September). The third quarter of 1967 was the most recent available at the time these arrangements were made. This statewide listing was then used as the population for sampling in Phase II and Phase III as well. For the interviews, a 10% random sample was drawn from this list to use as a basis, although in most cases financial limitations prevented full use of the 10% sample.

Questionnaire Development

Three interview questionnaires were under development from the outset of the project. Form I was designed to gather data about the firm itself, while Forms IIA and IIB were for employee information. The appendix shows samples of each form. All three forms were developed simultaneously and pre-tested in 10 businesses in Yolo County. Some revisions were made, primarily in format rather than content. Initial interviewing began in Stanislaus County in September of 1968, with some additional changes in format being made, along with the addition of a few supplementary questions (such as the age of the employee being interviewed) after a more thorough testing under actual field conditions. Despite these changes, interviews made with the original forms are included in the tabulations as valid since the basic questions remained essentially the same.

As stated above, Form I obtained data concerning the business or firm itself. It was the initial document utilized when an interviewer made contact with a firm, and was filled out by interviewing the owner, business manager, personnel manager, or some other member of top management. Form I questions dealt with the type of business involved, how long the firm had been in business, the number of people involved (both year-around and seasonal), the firm's source of the various levels of employees, the major source of information, and the seriousness of various types of personnel problems. In addition, a listing was obtained of all job titles in the business which required agricultural skill or competencies, how many people were currently involved in each job title, the number anticipated 5 years from now, the typical tenure of an employee in that title, and salary range.

TABLE 17

TYPES OF AGRICULTURAL FIRMS INTERVIEWED *

SIC **	SIC descriptions	Number of firms		# of job titles found	
		Statewide	Interviewed	Year Round	Seasonal
0112	Cotton farm (includes 0113, 0119)	2,343	53	9	9
0121	Citrus fruits	1,875	23	11	5
0122	Deciduous fruits & nuts	10,154	198	11	8
0123	Vegetables	1,430	54	13	8
0132	Dairies	2,207	54	9	4
0133	Poultry	933	24	7	2
0139	Livestock farms	2,059	24	6	3
0142	General crop farms	6,414	81	14	7
0192	Horticulture specialties	1,317	33	12	5
0193	Animal specialties	282	7	4	4
0712	Cotton gin, etc.	435	26	8	9
0718	Farm labor contractor	734	21	6	5
0719	Agricultural services (contract basis)	1,413	51	13	6
0722	Veterinary & animal hospital	897	13	5	2
0729	Animal husbandry services	491	26	9	4
0731	Horticulture services	1,470	15	9	2
0741	Hunting, traping, & game propagation	?	3	3	0
0751	Farm labor association (other than citrus)	117	8	7	5
0811	Forestry	50	5	3	2
2011	Meat packing, etc.	1,696	83	14	6
2871	Fertilizers and chemical mfg.	113	14	9	4
3522	Farm machinery and equipment mfg.	114	14	7	2

TABLE 17 - continued

SIC	SIC descriptions	Number of firms		# of job titles found	
		Statewide	Interviewed	Year Round	Seasonal
4221	Farm product warehousing and storage	255	14	5	3
4731	Stockyards	3	0		
4971	Irrigation systems	125	6	4	2
5040	Wholesale growing, packing, shipping fruits & vegetables	401	30	12	7
5041	Groceries, general line	927	18	7	3
5048	Wholesale, fruits and vegetables	657	14	9	5
5051	Farm products-raw material distributors	190	10	6	2
5083	Farm machinery and equipment wholesale	115	7	5	2
5089	Machinery, equipment, nec.	?	4	4	2
5099	Wholesalers, nec	251	44	11	3
5251	Hardware stores	1,180	6	4	3
5252	Farm equipment dealers	404	21	12	2
5962	Hay, grain, & feed stores	236	10	6	2
5969	Farm & garden supply	704	30	8	2
5992	Florists	1,000	15	4	3
6022	Financial institutions	411	20	7	1
6515	Lessors of agricultural forest, & similar	61	6	2	2
7342	Disinfecting and exterminating	402	4	3	1
7391	Research, development & testing labs	209	4	4	2
7699	Repair shops & related services	381	19	4	2
7941	Amusement & recreation services	417	14	7	2
8611	Business associations (non-profit)	?	10	5	2
8699	Membership organizations (non-profit)	?	3	2	1

TABLE 17 - continued

SIC	SIC Description	Number of firms		# of job titles found	
		Statewide	Interviewed	Year Round	Seasonal
9100	Federal Government	?	7	5	3
9200	State Government	?	22	8	3
9300	Local Government	?	13	6	3
				339	165

1,181 Firms interviewed - divided into 47 SIC groups.

* It is estimated that this sample represents about 2½ per cent of the agricultural firms in California.

** Standard Industrial Classification (1957 edition)

After completing Form I, the interviewer was then instructed to interview one employee in each of the job titles listed on Form I. This was not always possible, especially for seasonal jobs.

Forms IIA and IIB solicited information about the employee himself and the job he performed. Form IIA involved such items as sex, age, schooling, and the number of years in the job title currently held. He was also asked items about the job he was performing, e.g., requirements for entry on the job, what he liked and disliked about it, and the functions and activities actually performed on the job, both now and as he projected these functions and activities to the future.

Selection and Training of Interviewers

Probably the most desirable procedure would have been to hire and train one team of interviewers which would operate from a central location, traveling to the various counties to conduct the interviews. The distances and consequent cost made such a procedure impractical, even though most desirable from a data-gathering standpoint. Therefore, a team was selected and trained in each county.

The procedure varied somewhat in each county, but two types of interviewers were used in general. Initially, an effort was made to find and utilize men who were retired from the agricultural community. This system was used in the first two counties, Stanislaus and Butte. Although many successful interviews were completed by such men, several procedural problems forced consideration of another type of interviewer. Since each county contained at least one community college, a four-year college, or both, the use of agricultural students was then tried. Most of the interviews were conducted by students.

Whichever type of interviewer was used, the training process was essentially the same in every county. An informational meeting, held at a central location in each county, was attended by all those who, after an initial contact, thought they might be interested. The objectives of the study were outlined and the general procedure for

conducting the interviews was discussed, along with a brief description of the forms. This was followed by detailed discussion of the forms with all those still interested. At least one firm was then assigned to each prospective interviewer wanting to try the job. These initial interviews were to be done in the next few days. Prior to another general meeting of all interviewers, these first interviews were collected and gone over by either the Research Coordinator or the Survey Supervisor. At this meeting the forms were again discussed in detail, emphasizing any mistakes that had been made. This meeting left only those who were really interested in participation, and the team was ready to begin operation. One person in each county was designated as county coordinator. This person collected the interviews, reviewed each one, and either returned it to the interviewer or sent it on to the central office for coding and tabulation. Once this person began functioning effectively, the Survey Supervisor would spend less time in the area and could begin operations in another county.

Although this process resulted in over 100 people who did at least one interview used in the tabulation, over three fourths of the interviews were conducted by 20 interviewers and slightly over 50% were done by 10 people. Thus, most of the interviews were conducted by experienced and competent interviewers. This fact, coupled with various checks employed during the process, resulted in a set of data deserving confidence, even though control over each interviewer was not as great as in the more desirable system of having a single interview team operating from the central location.

Scope of Interviews

Interviews with employers totaled 1,354. Of these, 61 declared that no personnel in their business required any type of agricultural competencies. Another 112 forms were either incomplete or considered invalid for one reason or another, leaving 1,181 interviews for use in the tabulations and computations, discussed below.

Although the data are tabulated and reviewed for each SIC, a gross grouping is made for the following general discussion. All of the 01, 07, and 08 SIC's are grouped together and labeled Production Agriculture. This title is not completely accurate, since this group obviously contains firms not normally thought of as farms--such as cotton gins, animal hospitals, and forest services. It nevertheless seems more appropriate to include these 07 and 08 SIC's with the 01's than with the more industrial classifications. All of the other SIC's are grouped together in an agri-industry group.

It is obvious from Table 18 that the majority of firms interviewed are well established in their communities, for 54% have been in business for more than 20 years. There is little difference between the nonfarm and farm groups in this regard, although there is some variation within each group, as might be expected. In general, the agricultural services part of the farm group indicated a shorter tenure of business operation than the actual farms, with SIC 0718 (Farm Labor Contractors) being the lowest, with none over 30 years and only 14% in the category of 21-30 years. In the nonfarm group, the amusement and recreation services indicated the shortest business tenure.

TABLE 18

NUMBER OF YEARS FIRMS HAD BEEN IN BUSINESS

TYPE OF AGRICULTURAL BUSINESS		RESPONSES										
		1 or less	2 - 3	4 - 5	6 - 7	8 - 10	11 - 15	16 - 20	21 - 30	Over 30	Don't know No answer	Total
FARM	N	4	35	32	32	60	81	90	157	220	8	719
	%	1	5	4	4	8	11	13	22	31	1	
AGRI-INDUSTRY	N	7	15	17	18	36	50	50	84	181	4	462
	%	2	3	4	4	8	11	11	18	39	1	
TOTAL	N	11	50	49	50	96	131	140	241	401	12	1181
	%	1	4	4	4	8	11	12	20	34	1	

The Number of People In Each Firm

Table 19 shows the total people per firm involved in year-around job titles, while Table 20 gives the same information for seasonal personnel. In terms of year-around personnel, the nonfarm firms interviewed were somewhat larger, for only 6% reported having only one man involved year-around, whereas 18% had over 50 people working all year. In contrast, 15% of the farms reported a one-man year-around operation, and only 8% had over 50 working all year.

The situation is quite different, however, in terms of seasonal employees. Even though the percentage of farms and non-farms with large numbers of seasonal employees is about the same (respectively 10% and 8% with over 150), almost half of the nonfarm businesses have no seasonal employees, compared with less than 20% of the farms. Differences are considerable, of course, between types of farms, with over 50% of the dairies, poultry farms, and animal specialty farms reporting seasonal

TABLE 19

NUMBER OF PEOPLE IN YEAR-AROUND JOBS

TYPE OF AGRICULTURAL BUSINESS		RESPONSES										
			0	1	2, 3	4, 5	6 - 10	11 - 15	16 - 20	21 - 30	31 - 50	Over 50	Total
FARM	N	4	107	173	86	123	64	25	41	41	56	719
	%		15	24	12	17	9	3	6	6	8	
AGRI-INDUSTRY	N	0	26	62	58	81	49	25	47	32	82	462
	%		6	13	13	18	11	5	10	7	18	
TOTAL	N	3	113	235	144	204	113	50	88	73	138	1181
	%		11	20	12	17	10	4	7	6	12	

TABLE 20

NUMBER OF PEOPLE IN SEASONAL JOBS

TYPE OF AGRICULTURAL BUSINESS		RESPONSES										
		0	1 - 5	6 - 10	11 - 25	26 - 50	51 - 75	76 - 100	101 - 150	Over 150	No answer Don't know	Total
FARM	N	128	121	69	117	101	40	29	35	75	4	719
	%	18	17	10	16	14	6	4	5	10	1	
AGRI-INDUSTRY	N	219	104	32	21	17	11	5	13	37	3	462
	%	47	23	7	5	4	2	1	3	8	1	
TOTAL	N	347	225	101	138	118	51	34	48	112	7	1181
	%	29	19	9	12	10	4	3	4	9	1	

employees. The obvious fact remains, however, that businesses involved directly with production agriculture require more employees on a seasonal basis than do businesses not involved directly in production.

Although the tables are not included, data were also gathered on the number of people involved in the businesses who needed agricultural competencies. As expected, not all of the people employed require such competencies, but the data do not indicate a tremendous difference, even in the nonfarm businesses.

Sources of Employees

Of natural interest to educators is whether their institutions are considered a direct source of employees by employers. Therefore a question was included in an attempt to find out what employers felt were their primary sources of employees who need agricultural competencies. This was a check-list type of question, with more than one response possible per type of employee. The percentages are computed in terms of total responses rather than total firms. Tables 21, 22, and 23 respectively show the responses for unskilled, sales, and managerial personnel. Similar information is available but not shown for semi-skilled, office, supervisory, technical, and professional.

Responses to this question cannot be considered to be an absolute numerical representation of the actual situation, because of the somewhat ambiguous nature of the question, but comparisons and an examination of tendencies are legitimate. It is obvious from the three tables that no source of employees is dominant in any of the three cases, nor was there any in those not included. For most types of employees one source is listed substantially more often than the others, however, and two or three other sources appear to be important in the case of unskilled workers (Table 21). Informal sources are certainly listed the most frequently, with the farm businesses listing them in almost half the cases, 17% more than the nonfarm. Two other important sources are high schools and the Government Employment Service, with high schools being more important for agri-industry businesses than for production-agriculture businesses. Obvious throughout the responses to this question is the general trend for agri-industry businesses to indicate more use of formal sources of employees than farms do. Another example is shown in Table 23, where the main source of managerial personnel is definitely from within the company, but the agro-industry businesses list this 10% less than farms, while listing colleges 10% more frequently than do farms. In general, schools are not listed as frequently as educators would probably wish. There are several possible reasons. One is certainly the fact that there are more job openings in agriculture each year than there are graduates, and a nongraduate will usually become an employee through an informal channel rather than a formal channel. Another is that when a person working as a part-time employee while going to school becomes a full-time employee upon graduation, he is considered to have come from within the company. In spite of these and other factors, the responses to this question, coupled with observations made during various contacts with employers all during the study, lead to the the conclusion that

TABLE 21

FIRM'S PRIMARY SOURCE OF UNSKILLED WORKERS

TYPE OF AGRICULTURAL BUSINESS		RESPONSES										
		No answer	High school	Junior college	College	Within the company	Government employment service	Trade schools	Labor contractors	Informal sources	Other	Total
FARM	N	1023	79	6	4	6	55	1	45	203	26	425
	%		19	1	1	1	13	-	11	48	6	
AGRI-INDUSTRY	N	777	39	5	1	2	22	4	6	45	23	147
	%		27	3	1	1	15	3	4	31	16	
TOTAL	N	1800	118	11	5	8	77	5	51	248	49	572
	%		21	2	1	1	13	1	9	43	9	

TABLE 22

FIRM'S PRIMARY SOURCE OF SALES PERSONNEL

TYPE OF AGRICULTURAL BUSINESS		RESPONSES										
			No answer	High school	Junior college	College	Within the company	Government employment services	Trade schools	Labor contractors	Informal sources	Other	Total
FARM	N	1331	6	14	30	33	2	2	0	17	3	107
	%		6	13	28	31	2	2	0	16	3	
AGRI-INDUSTRY	N	727	17	25	44	58	5	0	1	35	12	197
	%		9	13	22	29	3	0	1	18	6	
TOTAL	N	2058	23	39	74	91	7	2	1	52	15	304
	%		8	13	24	30	2	1	-	17	5	

TABLE 23

FIRM'S PRIMARY SOURCE OF MANAGERIAL PERSONNEL

TYPE OF AGRICULTURAL BUSINESS		RESPONSES										
		No answer	High school	Junior college	College	Within the company	Government employment service	Trade schools	Labor contractors	Informal sources	Other	Total
FARM	N	1013	45	23	71	231	1	3	1	39	11	425
	%		11	5	17	54	-	1	-	9	3	
AGRI-INDUSTRY	N	571	30	22	96	154	14	1	0	26	10	353
	%		8	6	27	44	4	-	0	7	3	
TOTAL	N	1584	75	45	167	385	15	4	1	65	21	778
	%		10	6	21	49	2	-	-	8	3	

contact is insufficient between employers with jobs and schools with graduates qualified for the jobs. This is especially true at the high-school and community-college levels.

Educational Program of the Firm

Since, as discussed above schools are infrequently the primary source of employees, with jobs often filled from within the firm, educational opportunities within the firm should be important. Nevertheless, 57% of all production-agriculture employers responded that they had no educational program for their employees (Table 24). There is a range within the group, of course: only 30% of employers in such SIC categories as Horticultural Specialties, Animal Hospitals, and other horticultural and animal husbandry services indicated no program in contrast to over 70% of the field-crop farmers, citrus growers, and livestock raisers.

As one would expect in the more formalized agri-industry employment situation, fewer firms (35%) indicated no educational program. Here, too, there was variation within the group, though the tendency is obviously present that fewer firms have no program at all. In fact, all figures in Table 25 indicate that at least some type of training is more likely in agri-industry firms than in production-agriculture firms. Even these higher figures, however, are not very encouraging. What is most disappointing is the almost negligible (2%) use of public adult-education programs. Is the reason lack of encouragement by employers or failure of the educational system to provide appropriate programs? The answer is uncertain. It is known, however, that 234 courses were conducted through various kinds of adult-education program throughout California in the 1968-69 school year. Obviously, this is not enough to meet the need indicated by the questionnaire data reported here. An expanded adult-education effort is indicated.

Employee Problems: Lack of Qualified Personnel

The discussion above indicates that relatively few people are hired directly from educational institutions, that regular (or irregular) training programs are infrequent in businesses themselves, and that public adult-education programs are little used. These points would be of little consequence if fully qualified personnel to fill all jobs were abundant. However, other data from the interviews indicate that such is not the case. In fact, employers report a lack of qualified personnel to be their number one personnel problem.

The employers were presented with a list of items which are often identified as employee problems and asked to indicate whether each one was a serious problem, somewhat of a problem, or no problem in their business. Although given an opportunity to add to the list, only 4% did so.

In general, most responses were in the 'no problem' column. The item receiving the most responses of a serious problem or somewhat of a problem was 'Qualified Workers Not Available.' A dramatic 31% listed this as a serious problem, as shown in Table 25, while another 35%

TABLE 24

EDUCATIONAL PROGRAM OF THE FIRM

TYPE OF AGRICULTURAL BUSINESS		RESPONSES							
		No answer or don't know	Conducts own on regular basis	Conducts own on an irregular basis	Send employees to parent company training programs	Provides for & encourages participation in public adult ed. prog	Does not have one	Miscellaneous & combination responses	Total
FARM	N	29	21	209	5	9	407	41	719
	%	4	3	29	1	1	57	6	
AGRI-INDUSTRY	N	14	52	115	21	10	162	88	462
	%	3	11	25	6	2	35	19	
TOTAL	N	43	73	322	26	19	569	129	1181
	%	4	6	27	2	2	48	11	

TABLE 25

EMPLOYEE PROBLEMS: Qualified Workers Not Available

TYPE OF AGRICULTURAL BUSINESS		RESPONSES					
		(No answer)	A serious problem	Somewhat of a problem	No problem	Total (N - NA)
FARM	N	(31)	211	241	236	688
	%		31	35	34	
AGRI-INDUSTRY	N	(24)	128	140	170	438
	%		29	32	39	
TOTAL	N	(55)	339	381	406	1126
	%		30	34	36	

labeled it somewhat of a problem. The differences between farm and nonfarm businesses in this instance are negligible. While an approximate 1/3-1/3-1/3 split may not appear very dramatic by itself, it takes on added significance in view of the fact that this is the only problem identified as serious by more than 14% of the employers, and the only one where less than 50% of the employers checked it as no problem.

Next in seriousness was 'the need to train or retrain employees,' a closely related item. Here only 11% of all the employers felt that it was a serious problem, with a slightly higher frequency in farm employment than in agri-industry, respectively, 12% and 8%. This is comparable to the frequencies on other items, though only 51% listed it as no problem, which is considerably lower than for most items. Two other items related to training were less serious problems: time to do necessary retraining; and a lack of qualified personnel to do training. Even then, however, both of these items were still listed as 'no problem' by fewer employers than most other items unrelated to training.

Other Employee Problems

The more commonly expressed employee problems--turnover, absenteeism, attitude toward work, and retaining qualified workers--were accorded medium seriousness in comparison with the other problems on the list. The most serious of these was turnover, especially for farm employers, 17% of whom checked it as a serious problem, as compared with 8% of agri-industry employers (Table 26). The 57% in the 'no problem' column is another indication, being lower than any of the others except the two discussed in the section above. The pattern of responses is similar for absenteeism, attitude toward work, and retaining qualified workers, although the percentage recorded in the 'no problem' column moves up to around 70% for all, 60% for farm, and 80% for nonfarm employers.

The least serious set of problems for the employers interviewed are comprised of health and illness, accidents, insurance, and labor unions. In this set, the differences between production agriculture and agri-industry are negligible. The data for health and illness are given in Table 27 as an example of the response pattern, although the non-problem responses actually range from 76% (accidents) to 91% (labor union problems.)

Expected Change in Number of Employees in Next Five Years

Much has been written about the decrease in numbers of agricultural employees which has been occurring an is expected to occur in the immediate future. While this fact is undisputable, and more is said about numbers of employees in other sections of this report, nevertheless the majority of employers interviewed do not anticipate reductions in employee numbers. Table 28 shows that only 5% of the agri-industry and 13% of the production agriculture businesses indicated a decrease, while around half (57% for production agriculture and 49% for agri-industry) expected employee numbers to remain approximately the same. Some employers may have used this response when they were

TABLE 26

EMPLOYEE PROBLEMS: Turnover

TYPE OF AGRICULTURAL BUSINESS		(No answer)	A serious problem	Somewhat of a problem	No problem	Total (N - NA)
FARM	N	(30)	120	215	354	689
	%		17	31	51	
AGRI-INDUSTRY	N	(25)	34	114	289	437
	%		8	26	66	
TOTAL	N	(55)	154	329	643	1126
	%		14	29	57	

TABLE 27

EMPLOYEE PROBLEMS: Health and Illness

TYPE OF AGRICULTURAL BUSINESS		RESPONSES				
		(No answer)	A serious problem	Somewhat of a problem	No problem	Total (N - NA)
FARM	N	(32)	15	111	561	687
	%		2	16	82	
AGRI-INDUSTRY	N	(26)	6	80	350	436
	%		1	18	80	
TOTAL	N	(58)	21	191	911	1123
	%		2	17	81	

TABLE 28

ANTICIPATED INCREASE OR DECREASE IN NUMBER OF EMPLOYEES

TYPE OF AGRICULTURAL BUSINESS		RESPONSES					
		No answer don't know	Increase	Decrease	Remain the same	Other	Total
FARM	N	7	207	90	413	2	719
	%	1	29	13	57	-	
AGRI-INDUSTRY	N	5	207	21	225	4	462
	%	1	45	5	49	1	
TOTAL	N	12	414	111	638	6	1181
	%	1	35	9	54	1	

not sure what future trends were for their business. If that is true, it then makes the response of an increase that much more meaningful. Here the differences between production agriculture and agri-industry show as expected, since 45% of the agri-industry businesses show an anticipated increase, compared with 29% for farms, but even this lower percentage increase for farm employment is encouraging considering the frequency with which one reads of reduced job opportunities in agriculture. Most of those indicating an expected increase gave as their reason an increase in the volume of business, while reasons listed for a decrease in future jobs were mechanization, automation, and retirement.

It should be pointed out that the overall generality of this question reduces its validity in an absolute sense. For example, a farm business anticipating a decrease in seasonal farm hands due to mechanization, but an increase in skilled machine operators or mechanics for the same reason, would not show in a simple response of increase, decrease, or remain the same. Similarly, the situation is not visible where the firm anticipates a rise in the volume of business but expects to handle the increase without adding personnel through mechanization or automation. Even so, these data indicate a healthy employment situation in agriculture, at least for those trained in, or trainable for, the jobs which will be on the increase in the future. The jobs likely to be included in this category are discussed later in the report.

Firm Sources of Information to Keep Up-to-Date

Employers were also asked to rank the sources they and their employees used to help keep them up-to-date in their work. In both production agriuclture and agri-industry, the leading source was magazines or trade publications, followed by the University of California Agricultural Extension Service. The number 3 source was not the same for both groups, for farm employers ranked 'fieldmen or salesmen' next, whereas 'company training programs' was ranked third by nonfarm employers, a source which naturally ranked very low for farmers.

The total rankings of the two groups follow:

Rank	Production agriculture	Agri-industry
1	Magazines or trade publications	Magazines or trade publications
2	Univ. of Calif. Agr. Extension Service	U. C. Agr. Extension Service
3	Fieldmen or salesmen	Company training programs
4	Trade of professional organizations	Fieldmen or salesmen
5	Radio or television	Trade or professional organizations
6	Agricultural schools	Company publications
7	Company training programs	Agricultural schools
8	Other	Other
9	Company publications	Radio and television

Summary of the Data on Firms

The data presented in this section indicate that agricultural employers feel that their most serious personnel problem is a lack of qualified personnel, and second-most serious to be the related problem of the need to train. At the same time, relatively few employers list schools as a direct source of employees, and many employers have no program of education within their own organization. An obvious conclusion is that there must be more communication between those involved in agricultural education programs and those involved as employers if the major problem of a lack of qualified employees is to be corrected. Employers need to be aware of the potential employees available as graduates of agricultural education programs. Educators must be aware of what is needed by employers so that their graduates are in fact qualified. Adult-education programs must be available and utilized to fill in whatever gaps exist in qualifications and to develop skills, competencies, and knowledge that can lead to advancement. All three sides of the triangle need strengthening.

Chapter V

Study Findings From Employee Interviews

As stated previously, all job titles requiring agricultural competencies were listed by the employer. One person in each job title was then interviewed whenever possible. This process resulted in 4,566 interviews in 1,181 firms, with employees in 340 job titles. No interviews were conducted in an additional 37 titles listed by employers, but very few people were involved.

Even though 381 different titles were identified by employers, for the purposes of this report only 57 titles, involving approximately 50 or more year-around people, are classified as major titles. These 57 titles account for over three fourths (77.6%) of the year-around jobs listed, as well as 77% of all the new year-around jobs forecast for the next 5 years. All of the interview data are included in the discussion which follows, but the information reflects mostly the responses in the 57 major titles, for these made up 73% of the interviews.

Although data are available on the individual job titles, the jobs are grouped for our purposes as: 1) laborers, production agriculture; 2) equipment operation, maintenance, and repair; 3) processing-plant workers; 4) landscape and nursery workers; 5) livestock workers; 6) sales personnel; 7) technical and quality-control workers; 8) forestry and timber workers; 9) office personnel; 10) managers, supervisors, and foremen; 11) professional; 12) owner/operators; and 13) miscellaneous jobs. In discussion of the categories, the numbers of these jobs and employer estimates of trends in numbers 5 years in the future are given from the Form I data, while the rest of the discussion is based on Form IIA. Refer to Table 29 for the number of interviews in each group. The data from Form IIB, the detailing of functions and activities of each job by the job holder, are not included in this report. A rather detailed description of each job title is to be published at a later date.

Responses to some of the items on Form IIA (See Appendix) either do not vary enough to be discussed extensively by group, or seem more appropriately discussed by item rather than by group. For example, the occupants interviewed in almost all job titles are predominantly male, with a majority being female in only one group, office workers. Processing-plant workers, landscape and nursery workers, and technicians and quality-control personnel are approximately 80% male, while all other groups are over 90% male.

A premium is placed on having some experience before entering any of these jobs on a full-time basis, since over 80% of the respondents in all groups, except professional and miscellaneous, indicated that on-the-job experience is necessary. Even in these two exceptions, respectively 75% and 73% responded in this manner. Less than 10% of all respondents felt that these jobs could be entered without some

TABLE 29

GROUPING OF TOTAL JOB TITLES REPORTED
IN EMPLOYEE INTERVIEWS*

	Job Titles/ Group	Number of Interviews in Each Title Group
Laborers, Production Agric.	20	376
Equipment Operation & Repair	37	511
Processing Plant Workers	45	202
Landscape & Nursery Workers	21	88
Livestock Workers	17	146
Sales Personnel	9	240
Technician & Quality Control	26	97
Forestry & Timber Workers	23	28
Office Personnel	10	352
Manager, Supervisor, Foreman	17	1,425
Professional	44	234
Owner-Operator	52	811
Miscellaneous	19	56
	340	4,566

* Totals came from 1,181 Firms (including government agencies) that were interviewed.

experience. This has special significance for educators, underscoring the importance of work experience, involvement in projects, and other forms of supervised practice in conjunction with classroom work.

In addition to the experience required for entry and the educational requirement, the interviewees were asked if there were other limitations on job entry. The most frequent response was that there are no other limitations, although this varied from a low of 30% of responses of processing-plant workers to a high of almot 70% for landscape and nursery workers and office personnel. Physical limitations were the item mentioned most frequently, ranging from 9% for office personnel to approximately 40% for equipment operators and repairmen, hand laborers, and livestock workers--the "hard work" jobs of farming. Labor-union membership was listed by 21% of the processing-plant workers and by a few in other groups, while a license or certificate was a requirement for 18% of the professional workers interviewed.

Interviewees were also asked what the requirements were for them to advance on their jobs. In most groups of jobs, 20-50% saw no advancement potential. On the basis of this question, the greatest-felt potential is in the sales group, where only 12% saw no such opportunity. Other groups where the percentage is lower than most are landscape and nursery workers, technicians, and professionals. Of those who did see some potential for advancement in their jobs, a distinct majority listed on-the-job training as the means. Adult-education programs were listed frequently in all groups, while further college was mentioned by over 20% of the professionals and technicians.

Laborers--Production Agriculture

Production agriculture is dominated by the job titles of field hand (33%) and harvest hand (41%). These two classes of workers, both almost exclusively seasonal titles, encompass 87% of the 13,000 employees in the 1,181 firms contacted. The 87% may even be too low, since many farmers contract for field crews and harvest crews and hence did not include contract labor employees in listing those who worked for them. Another predominantly seasonal title is pruner, fruit and nut tree. Farm hand and irrigator are two job titles that are about equally divided between year-around and seasonal. Farm hands are usually thought of as year-around, and irrigators as seasonal employees. However, an irrigator employed at odd jobs during winter months would more properly be classified as a farm hand than as an irrigator. The farm hand title should be reserved for year-around jobs, while seasonal jobs of a similar nature should be included in the field hand title. Minor titles included in this category are almond knocker, bundle stacker, ditch digger, and swamper. For a complete list of all job titles identified and interviewed, refer to Appendix C.

Jobs included in this group require little formal educational preparation, and for that reason a majority (80%) are filled by people who have less than a high-school education. Sixty-three percent of the employees themselves stated that completion of high school was not necessary for entry into their jobs. Perhaps that is the reason

that most educators have ignored this class of worker. Certain factors, however, make this point of view questionable. First of all, these jobs are among the few that a person with less than a high-school education can obtain. It is an obvious fact that not all students complete high school. As a result, they are dumped on the labor market without adequate skills or knowledge to enable them to perform job tasks satifactorily. Employability is enhanced if knowledge and skill are obtained prior to job entry. Also, additional job training would allow persons to compete more successfully for the year-around jobs and to progress up the job classification scale to higher pay and higher job satisfaction.

Although actual numbers of jobs cannot be determined through the sampling process utilized in this phase of the study, the trend is obvious toward a decrease in the number of seasonal jobs in this category. However, decreases cannot be predicted with accuracy, and employers seemed hesitant to predict any change in personnel numbers unless they had firm reasons for doing so. There is no doubt that the number of field hands and harvest hands required will decrease. On the other hand, a slight increase is definitely indicated for the year-around jobs in this category. The magnitude, although larger than the decrease in seasonal jobs, is estimated at only about 5%. Since these are the jobs with which vocational educators in high schools should be concerned, this increase is noteworthy.

The majority of the jobs in this category are, of course, found on farms, although a few are in companies classified in some other SIC but involved with production agriculture as well. Farm hands, field hands, harvest hands, and irrigators are distributed quite widely among the various types of farms, although specific types may be limited to one or two SIC's. For example, farm hand (livestock) is found almost exclusively in dairies (0132), livestock, farms (0139), and the general farm group (0142-0144); while harvest hand (citrus) is encountered in SIC 0121 (citrus fruit), the 0712 group (including citrus packing houses), and the 0751 group (including citrus labor associations).

Equipment Operation, Maintenance, and Repair

The jobs in this category are involved in operation, maintenance, repair, and construction of equipment and machinery, both on and off farms. The predominant job titles are equipment operator, general; mechanic, general; repairman; tractor operator, general; and truck driver, general. These five titles account for almost three fourths of the personnel listed, although 37 titles are included in the category. Other major titles are equipment repairman; chemical applicator equipment operator; and truck driver, delivery.

With 3,139 jobs listed by the employers interviewed, this is a smaller category than the laborer group. Even though smaller in total number of jobs, two thirds (2,063) are described as year-around, in contrast to only 1,701 year-around jobs in the laborer group. This group is also of greater interest to educators, because of the higher skill requirements of many of the jobs. Support for this is expressed

by the job holders themselves, for almost half stated that completion of high school was necessary for their job, and an additional 12% felt that community college or some college study was required.

There are some differences within the group in feelings about the education requirement. In general, the lowest level of educational attainment is sufficient for a subgroup composed of the specialty-equipment operators, specifically chemical applicator equipment operator, cotton picker operator, forklift operator, and hay machinery operator. Over half of the occupants of these job titles (54%) feel that completion of high school is not required for their jobs, while only 38% feel a high-school diploma is required. These data suggest that high school is the most education necessary for these jobs, and that most can be obtained without completing high school. Unfortunately the limits of any categorization can never be completely decisive, and another job title, heavy-equipment operator, might be included with these specialty-equipment operators. If so, it would be a possible exception in terms of education, since over half of these job holders (53%) feel that a high-school diploma is necessary and another 16% believe that community-college work is required.

The highest educational attainment is required in a subgroup where jobs are related to the repairing of machinery and equipment, represented by such titles as equipment repairman; mechanic, general; mechanic's helper; parts manager; welder; and parts man (the two underlined being major titles). In this subgroup 25% indicate that community-college work is required for entry, whereas in all other subgroups less than 10% indicate such requirement. While 25% is not a large enough percentage to conclude that community-college study is really required for entry, it is obvious that more training is necessary than for other jobs in this group. Again, the subgrouping is not clear-cut, for the major title of repairman should be included in this subgroup by function. However, the indicated educational requirement is more similar to that of other subgroups, for only 9% indicated community-college instruction as a requirement.

The other subgroups include the major titles of tractor operator, general; truck driver, general; and equipment operator, general. In terms of educational requirements they fall between the two subgroups described above. The tendency in these groups is toward the completion of high school, although the majority of those in the title of tractor operator, general, did not feel that completion of high school is necessary. A division of this very general title into more specific titles would probably eliminate this apparent inconsistency. In other words, the functions and activities of some tractor drivers are very similar to those of specialty-equipment operators, whereas others are required to have much more skill and knowledge.

In terms of subject-matter areas in education, the data from these employees indicate that the mechanical or engineering area is the most important, with 48% indicating that it is highly necessary and an additional 42% checking 'somewhat necessary.' Speech is next in line,

followed by mathematics and English. Agricultural production is next, and is the only other subject area for which less than 50% of these employees checked the 'unnecessary' column. There are few striking differences within the group, although agricultural production is more important to general tractor drivers and equipment operators than it is to those in the other subgroups. The type of agricultural production knowledge which is necessary is predominantly crop production, with little animal production mentioned.

The responses indicate that the people in these job titles are involved very little in the decision-making process. Only 25% of the total are involved in anything more than low-level operating decisions, although this figure is 44% in the repair subgroup. Over 90% of all of the respondents indicate that they make no policy decisions.

There is no outstanding response pointing to any single characteristic that these employees feel can be used to distinguish between a good and an average holder of any of these jobs. Experience or knowledge leads the list, though it was given in only about 30% of the cases. Truck drivers made this response less frequently than the other subgroups, and they gave equal importance to dependability.

Employees in the five predominant titles of this group are found in both the farm and nonfarm segments of the industry. Year-around equipment operators and tractor operators are more prevalent on farms than in nonfarm businesses, while the reverse is true for repairmen and truck drivers. Mechanics are even split. Seasonal jobs are not extensive in these titles, but, when they are present they are divided between farm and nonfarm in a pattern similar to that of the year-around jobs with one exception. Seasonal truck drivers are found more commonly on farms than in nonfarm businesses, the reverse of the situation for year-around truck drivers.

The employers interviewed predict a substantial increase of 13% in year-around jobs in this category. This increase is distributed throughout the job titles, although the numbers are concentrated in the five predominant titles, of course. The predicted increase is smaller for tractor operators than for the group as a whole, and greater for mechanics.

The overall trend indicated for seasonal jobs in this category is toward a slight increase of 2%, although seasonal jobs on farms in this category show a slight decrease. It is noteworthy that seasonal employment in some titles is expected to decrease, although the only title involved is tractor operator, general. In addition, a decrease is expected in seasonal cotton-picker operators, chemical-applicator operators, and cotton-picker mechanics.

Processing-Plant Workers

This category is similar to laborer jobs in production agriculture, being generally low in skill. The difference, of course, is that the workers in the jobs in this group process rather than produce agricultural

products. These low-skill jobs are seldom of primary interest to educators since the knowledge and skills required are easily taught in a short time. In addition, they are generally not thought of as jobs which require agricultural education, an idea substantiated by the interviewees themselves since 61% of those interviewed felt that agricultural production was unnecessary as a subject-matter area. Nevertheless they are agricultural jobs, and are therefore included in this overall summary.

This is the second-largest group in total number of jobs, with 3,268 listed by the employers interviewed. Since 77% of these are seasonal, this is also the second-largest category of seasonal jobs. The 749 year-around jobs do not make it a large group in terms of year-around jobs, nor is the 8% expected increase as large as the year-around increase expected in most of the other categories. The percentage of seasonal jobs will increase about half as much.

Although there are fifty titles in this category, there are only six which might be considered major when the number of year-around jobs listed by the employers is considered. These are butcher; dairy plant worker; service company worker; processing plant worker; shed hand; and warehouse man. Other year-around titles listed almost as frequently are mill sifter operator; weighmaster packer, fruit; and packer, vegetable; while the titles listed frequently as seasonal are ginner; sorter, fruit and vegetable.

As expected, the educational attainment of these workers is relatively low, with slightly over 50% not completing high school, and 36% indicating that they had not gone beyond completing high school. This is consistent with their feelings about the education required: 50% felt that a high school diploma was the most required, and about 40% felt even that was unnecessary. Thus, 90% definitely felt no need for education beyond high school. In some titles, the need for a high-school diploma was felt even less, for 74% of the packers, sorters, and shed hands responded that completion of high school was not required. In view of the responses, no area of academic training can be listed as highly necessary. Speech was given the most 'highly necessary' responses (25%) followed by 23% for English and mathematics and 11% for agricultural production. The agricultural production knowledge, according to 80% of the few individuals who felt it is important, is necessary only to facilitate doing one's job, not for direct production.

A few are involved in making operational decisions, with 21% making at least middle-level operating decisions, but 90% make no policy decisions. No factor stands out as being the difference between a good worker and an average worker, for accuracy, hard work, knowledge, dependability, and attitude were each mentioned about 20% of the time.

Landscape and Nursery Workers

Although this group was not one of the larger groups in numbers of people, it is expected to be one of the fastest-growing groups. Year-around jobs in the firms in the sample totaled 379, with a 29% increase (156 additional jobs) predicted in the next 5 years. In

addition, most of the businesses in the Standard Industrial Classifications in which these job titles are found indicate an increase in the number of employees. Some of this increase in year-around jobs will be offset by a slight decrease in seasonal jobs (a 2% decrease indicated for the 141 seasonal jobs listed by the employers interviewed.

The major titles in this classification as identified in the interviews are gardener, greensman, nursery worker, and landscape worker. Titles also listed frequently are propagator and budder. All of these titles except greensman and budder have an anticipated increase rate higher than that indicated for the group as a whole. The majority of these jobs are found in the nonfarm sector of the agricultural industry, although SIC 0192 (Horticultural Specialties) and 0731 (Horticultural Services) are major employers which are in the farm sector. The major employing SIC's in the nonfarm sector are 5959 (Farm and Garden Supply Stores), 5992 (Florists), the 7941 group (Public and Private Golf Courses and other recreational facilities), and 9100, 9200, 9300 (Federal, State, and Local Governments). Almost 75% of the jobs in this group are year-around, although one major job title, nursery worker, has more seasonal than year-around jobs. This title contains about two thirds of the seasonal titles for the entire group, but a decrease is anticipated in the seasonal jobs while a major increase is anticipated in year-around nursery workers. Although 80% of the people interviewed in these jobs were male, 57% of the floral designers were female. Women are also found in other titles.

Completion of high school, at least, appears to be a necessity for most of the jobs in this category, for only 19% of the total interviewees felt their job could be entered without completing high school. Slightly over half (52%) of the total said that a high-school diploma is necessary, while 21% felt that community college is a requirement. An additional 8% (mostly landscape gardeners) stated that a college degree should be obtained.

The subject-matter areas considered most important by those interviewed were speech, agricultural production, and English, in that order, with mathematics and biological sciences next. The emphasis in agricultural production is, of course, on ornamental and recreational plant production, with other crop production of secondary importance.

Almost 90% of the responses relative to operating decisions on the job were categorized as either low level or none, while over 90% were in the "no-decision" category for policy decisions. Experience or knowledge, interest or attitude, and accuracy were the three categories in which most of the responses were placed with reference to the difference between a good worker and an average worker.

Livestock Workers

This category is composed primarily of jobs where the work is with livestock production on farms, although other types of animal care are involved in a few of the jobs. It is a relatively small category, with the interviewed employers listing only a total of 431 jobs.

Seasonal jobs are so infrequent that information on them is too fragmented to be discussed.

The major titles of the 19 listed are herdsman; milking-machine operator; and feeder, livestock. Two other titles encountered fairly frequently are veterinarian assistant and poultry feeder.

The level of educational attainment of those holding these jobs was not high, with only 28% having completed high school and only 10% completing some schooling beyond high school. This is reasonably consistent with total interviewees' opinions as to the education required for job entry (almost 90% felt completion of high school was most necessary) but it is not consistent for the major title of herdsman or for the title veterinarian assistant. In these cases, almost 40% felt that at least a community-college education was necessary, with one third of such respondents in the herdsman title stating that a 4-year college degree is necessary. It is possible that the herdsman job is in transition, with more technical information now required than previously.

None of the academic areas stand out as exceptionally important. Agricultural production was listed as highly necessary more than was any other area (35%, as compared with 25% for speech, the next-highest area). Almost 80% of the herdsmen felt that agricultural production is highly necessary, another indication of the higher technical level required for that title. Another difference in the responses of herdsmen is in the area of labor management (over 50% labeled it highly necessary, whereas 70% of the entire group felt no necessity for it).

The majority (65%) of the respondents in this group who felt that agricultural knowledge was necessary said that the area of interest was in dairy animals, with another 25% indicating animal production other than dairy. Over 60% needed the information because they were involved directly in production, and almost all the rest needed it to facilitate doing their job.

Ninety per cent of all livestock-job respondents indicated that they made no operational decisions or did so only at a low level. In contrast, 38% of the herdsmen said their job required middle-level decision-making.

No characteristic was listed often enough to be considered decisive in distinguishing good from average workers. Dependability and interest were each listed about 25% of the time, and accuracy, knowledge, and hard work about 15% of the time. Liking for animals was the most frequent characteristic of these people, appearing in 45% of the responses. A majority (52%) of the negative reactions to the jobs concerned long hours and/or scarcity of vacations.

The major titles in this group are found primarily on dairy farms (0132), livestock farms (0139), and general farms (0142, 0143, 0144). Veterinarian assistant is, of course, a title in 0722, Veterinarian and Animal Hospitals, as are such infrequently encountered titles as caretaker, small animal, and caretaker, large animal. Poultry feeder is

specific to 0133, Poultry Farms, while such titles as auction worker, auctioneer, groom, horse breaker, and horse trainer are encountered occasionally in both 0719, Agricultural Services, n.e.c.; and 0729, Animal Husbandry services, n.e.c.

Sales Personnel

Employers listed 1,023 jobs in the category of sales personnel. Of these 93% are year-around. The number of seasonal jobs is small, but employers project a substantial increase (20%). Year-around jobs are also expected to increase, for the 294 new jobs listed by employers represent a 24% increase, one of the largest in both actual number and percentage. Only the categories which include managerial and supervisorial personnel and equipment operators and repairmen are larger in terms of the actual number of new year-around jobs listed.

Only eight titles are involved in this category, which is considerably less than any other category except Office Personnel. Five of these are major titles: fieldman; sales manager; sales or store clerk; salesman, field or route; and salesman, store. Most of the relatively few seasonal jobs are found among the fieldmen, route salesmen, and store salesmen. Almost half of both the year-around and seasonal jobs are in the title salesman, field or route.

The majority of these jobs are, of course, in the nonfarm division, and are quite widespread throughout those SIC's. The smaller groups of jobs in the farm division are found almost exclusively in 0192 (Horticultural Specialties) and the 07 (service businesses) group.

The level of education attained by occupants of these jobs is quite varied, with 28% completing high school, 37% having some college, 28% having a college degree, and 3% having done some work beyond a degree. Although there are variations according to specific titles, only two of these seem large enough to mention. The occupants of sales-manager jobs have more education than the group as a whole, as evidenced by 38% having a college degree and 2% some work beyond. Sales clerks, on the other hand, have less as a group, with 83% having only completed high school or less. With these two exceptions, it appears that there is more variation in the attainment within titles than there is between titles in this category. However, the education required, in the opinion of the job holders, does vary according to title, with less variance within the titles. As a group, 26% felt that high school was the most required, while 39% indicated community college and 34% college. Community college, however, is recommended by approximately half of the fieldmen and field or route salesmen, with around 30% listing a college degree. A majority (56%) of the sales managers felt that a college degree is required, although 33% feel community college will suffice. On the other hand, the majority of sales clerks and store salesmen feel that completion of high school is the most required. Summarizing by taking the majority opinion in the major titles of the group, the titles sales or store clerk and salesman, store, require completion of high school; fieldman and salesman, field or route, require community college; and sales manager requires college.

The respondents felt that the type of academic preparation necessary is extensive too, since no academic area was listed by 50% as being unnecessary. Speech appears the most vital (87% felt it highly necessary). Other areas to which over 50% applied the 'highly necessary' label are English (65%), mathematics (56%), and agricultural production (51%). Ranked high by sales managers were business management and labor management.

Crop production was listed as the type of agricultural production needed by 42% of those who felt this was highly necessary or somewhat necessary, while 25% said a nonspecific broad knowledge was what they needed. The reasons given were: to facilitate doing one's job (38%), to advise customers (20%), and to aid in marketing agricultural products (18%).

The involvement of this group in the making of operational decisions is relatively high, for 58% indicated they make middle-level operational decisions and another 9% make high-level or all such decisions. Involvement in policy decisions is still not great, although the percentage making none is down to 65, lower than in most other categories. Some sales managers (13%) make all policy decisions.

From the likes and dislikes mentioned, people in this category must be able to get along with others. Human relations was the like mentioned more frequently than any other, totaling 38% of the responses to this question; another 4% mentioned the customers. Dislikes often included these same two items, however, with customers mentioned by 23% and human relations 10%. The only other dislikes mentioned as frequently were the hours and vacations. The only other items consistently listed favorably were challenge and variety, marked 24% of the time.

Technicians and Quality-Control Personnel

Although two types of workers are indicated in the title of this category, actual separation would be difficult. Overlap is considerable in the functions and activities of technician-type jobs and quality control jobs. In both types, for example, the person in some jobs is engaged in taking samples, making tests, and evaluating results. A division might be made on the basis of the extent to which evaluation is involved, and on how much the person has control over what happens after evaluation. Current titles are not that definitive, although a job-title system indicating such differences would be desirable.

A similar problem exists with regard to the wide range of skill levels involved. Fruit grader and vegetable grader include activities similar to those of sorters in another category who need only a minimal specific knowledge. On the other hand, this category includes the quality-control specialist title, which requires at least a college degree according to 80% of the title holders interviewed. This variance even occurs within titles. The title field checker, for example, includes people who check containers of fruit after it has been picked as well as representatives of processing plants who check fields to see if

proper management procedures are being followed and whether the crop is ready to harvest, and may even supervise the harvest operation.

There are 27 titles in this category, with 1,072 jobs listed by the employers interviewed. Of these, only 271 (25%) are year-around. The remaining seasonal jobs are almost exclusively in four titles: fruit grader, pest-control inspector, vegetable grader, and fresh-product inspector. The percentage of year-around jobs in the other 23 titles is almost 90%.

Employers anticipate 90 new year-around jobs, a 25% increase, while seasonal jobs are expected to increase only 5% (by slightly over 40). Decreases are in fact anticipated in several seasonal jobs, while all year-around titles but one will either increase or remain the same.

In addition to the four titles already mentioned as large seasonal jobs, other frequently encountered titles are field checker, laboratory technician, quality-control grader, and quality-control specialist. These four titles account for almot 50% of the year-around titles, with the rate of expected increase being slightly higher in these four than in the category as a whole. However, only one title, Laboratory Technician, was listed often enough to be classified as a major year-around title.

Because of the variety in the type of titles included in this category (discussed previously), educational requirements for entry are not clear-cut. If responses from all of those interviewed in these job titles are taken together, 33% indicate a college degree, 27% some college, 25% completion of high school, and 12% none. However, removing those in the quality-control specialist title and the grader-type jobs reduces the responses for college to 18% and the responses for none to 8%, while raising the level of response for community college to 33%, which is more what one would expect for this category. Responses for the major title laboratory technician, for example, are in the expected pattern. In this case, 58% feel that community college is required, 17% indicate that only a high-school diploma is necessary, and 25% check a college degree. In spite of the variety of responses, community college is the primary institution actually involved in training for jobs in this category, although a high-school diploma will suffice for some and a college degree is required for others.

The subject-matter areas declared most important are speech, English, mathematics, and agricultural production, with over 70% feeling that these areas are either highly necessary or somewhat necessary. When only the 'highly necessary' column is considered, speech and English respectively 67% and 63% are the leaders followed by mathematics (51%) and agricultural production (42%). Physical sciences and biological sciences are also important, each having 67% of the responses in the 'highly necessary' or 'somewhat necessary' column.

The type of agricultural production considered most necessary is crop production, with 43% marking this category. Some 33% marked a

broad nonspecific knowledge. Even though agricultural production was felt either highly or somewhat necessary by almost three fourths of the technicians and quality-control personnel, few are involved in direct production. This is exemplified by the fact that 65% who responded this way stated that the knowledge necessary was broad in nature and was needed to facilitate doing one's job rather than required for direct use in production. Another 11% felt it was necessary so they could advise their customers, not use it themselves.

Job holders in these titles participate in the operational decisions of their jobs: almost 50% in middle-level operational decision and 6% in all such decisions. Only 14% felt they made no operational decisions. Policy descisions are another matter, however, for 80% declared they made no such decisions, and 13% made very few.

As to what was liked about these jobs, responses were not numerous, with around half in the area of the variety and challenge of the job. Dislikes were not listed frequently enough to allow specific comment.

Forestry and Timber Workers

Employers identified only 215 jobs in the category of forestry and timber workers, and only 28 interviews were actually conducted with holders of these jobs. The data are therefore too limited to suggest anything other than that job opportunities are not widespread in this category. Nevertheless, educational institutions have programs at all levels in forestry and the forestry services. Such training programs swhould remain limited to those areas where a definite need can be demonstrated.

Only two job titles, forest lookout and forest service worker, are listed often enough to be considered major titles. All jobs identified with these titles are seasonal, however, so no major titles are identified for this category. The primary employers are the State and Federal Forest Services.

Office Personnel

Although office personnel are not usually considered "agricultural personnel," employers frequently listed them as requiring agricultural skill or knowledge. They are therefore included. The employees themselves support this concept, for 16% felt that agricultural production, as an area of academic training, is highly necessary, and another 43% felt it somewhat necessary. Hence, even though 40% responded 'unnecessary' it is obvious that some agricultural knowledge is required for holders of these job titles and that their inclusion is legitimate.

The four major titles bookkeeper, office clerk, office manager, and secretary comprise over 80% of the 548 year-around jobs listed in this category by the employers interviewed. Seasonal jobs account for only 38 additional jobs (6% of the total) and therefore are not of significance in a discussion of the category. Of the 38 seasonal jobs, 29 were office clerks. A modest increase of 10% in year-around jobs in

these titles is predicted by the employers.

Nonfarm jobs outnumber farm jobs in this category by a margin of 3 to 2. Most are in the larger operations but are found throughout the spectrum of businesses in both divisions. It is not uncommon, however, for a wife to be classified in one of these titles in a small operation. Slightly over half of the interviewees from these titles are women, the only category in which women even approach a majority, although there are individual titles in other categories that are held predominantly by females.

As a group, 43% felt that a community-college education is required for entry in these positions, and almost 30% of those interviewed had that much education and 30% had more. Less than 30% indicated that a high-school diploma was all that was required, and approximately the same percentage said they thought a college degree was necessary. Although responses within job titles are fairly consistent with these category percentages, there are some distinct differences. A college degree, for example, is necessary for accountants according to 62% of those interviewed, and another 10% say that an advanced degree is required. A college degree is also indicated as being necessary by 86% of the business managers. On the other hand, 73% of the dispatchers could see a need for only a high-school education for their job, as did 56% of the office clerks.

As stated above, agricultural production was not an academic area that a majority saw as being highly necessary, for only 16% placed it in that category and 40% declared it unnecessary. As would be expected, the leading academic areas for this category are English, business, speech, and mathematics, with respectively 83%, 80%, 79%, and 75% in the 'highly necessary' column. Individual titles corresponded to the group's reaction fairly well, although 93% of the business managers also included business management in the 'highly necessary' column.

The type of necessary knowledge in agricultural production was led by crop production (42%), followed by nonspecific broad knowledge (35%). While 5% said they needed the knowledge because of direct contact with production and 8% to advise customers, 66% wanted it to facilitate doing their job.

Middle-level operating decisions are made by almost 50% of this group, and high-level or almost all of operating decisions are made by 13%. The percentage not involved in policy decisions is almost down to 60% for these office workers, while 33% of the business managers make all of the policy decisions. Identified most frequently as what the respondents like about their jobs were the challenge and variety (mentioned in 36% of the responses). Other responses were office work (11%), human relations (12%), and a sense of accomplishment (6%). No single negative comment was outstanding; listed about 15% of the time were various controls (including government) and red tape, excessive pressure, and office work.

Managerial and Supervisorial Personnel

The 3,085 jobs listed by interviewed employers make management and supervisorial the fourth-largest category in total jobs. Since almost 90% are year-around, the 2,759 year-around jobs constitute the largest group encountered. Employers also listed 483 new year-around jobs in the next five years, and while this 15% increase is moderate in percentage it is by far the largest in total number representing over one fourth of the total new jobs listed. Seasonal jobs are not a major element in this group, since only slightly over 10% are so classified. Most of those were in two titles, however--crew foreman, with by far the most, and division foreman--so the seasonal possibilities in these two titles should be taken into account. These two titles have the largest number of year-around jobs as well, with other major titles being assistant foreman; assistant manager; division manager; foreman, general; and manager. Specialized divisional managers, such as plant manager and production manager, are not listed as frequently, but, like supervisor, they are still major titles and are vital in the larger operations. As business units increase in size, the frequency of such titles will also increase.

The titles in this group are encountered throughout the industry, with the farming sector having more than the nonfarm. This difference is accounted for primarily in the foreman titles, however, with the edge being in the nonfarm sector for the higher-level positions.

When discussing educational requirements, this category should be divided into two divisions: foreman-level jobs, and managerial. In general, people employed as foremen have less education than the managers and feel that less education is required. Specifically, slightly over 20% of the foremen have gone further than high school, and 44% have not even completed high school. In contrast, only 12% of the managers have failed to complete high school, while 60% have at least some college, with 27% holding a college degree and 8% having done work beyond the degree. As indicated, these differences are also reflected in opinions on the education required for job entry. Completion of high school is felt sufficient by 45% of the foremen, and 20% do not even feel that completion is required. Conversely, a college degree is necessary in the opinion of 46% of the managers, and another 5% even recommended an advanced degree.

Although titles also differ as to the importance of the various areas of academic training, they differ mainly as to whether a particular area is 'highly' or 'somewhat' necessary. Responses of 'unnecessary' are relatively consistent, below 10% for the academic areas of English, speech, mathematics, and labor management. Three areas in which 'unnecessary' responses are around 20% are agricultural production, business management, and engineering or mechanics. Foremen and managers differ again as to whether business management is 'unnecessary,' being so labeled by less than managerial titles and 25-58% of foreman titles.

Crop production is listed as either 'highly' or 'somewhat' necessary by almost 50% of those interviewed and another 10% listed ornamental

and recreational plant production. Livestock and poultry production received 10% of the responses, while a nonspecific broad knowledge was listed by 17%. The knowledge was needed by 34% for direct production, by 44% to facilitate their job, by 7% to advise customers, and by 5% to give better service.

Middle-level operating decisions are made by about half of this group, and 23% make high-level or all such decisions. Involvement in policy decisions is still not high even in this group, for 54% make no such decisions. However, almost 10% make all policy decisions and another 20% are involved in some way.

The qualities given most frequently as making the difference between a good and average manager or supervisor were experience or knowledge and human relations, each being listed almost 25% of the time. Mentioned approximately 15% of the time were interest or attitude and hard work or effort.

Mentioned most frequently as what is liked about these jobs were the challenge and variety presented, being listed 38% of the time by managers and 23% by foremen. Two items listed as likes between 10 and 20% of the time were human relations and a sense of accomplishment. The most frequently mentioned dislikes were long hours and lack of adequate time off, with foremen listing it 30% of the time, and managers 22%. Trying to perform in these jobs is a disadvantage when supervision is not enjoyed, for 20% of the negative responses of foremen and 12% of the manager's were their dislike of supervising others. Another 8% of the manager dislikes concerned relations with customers.

Professional Jobs

Although the 45 titles identified as professional jobs employers make this one of the larger categories in terms of different job titles, only 444 people were listed in these titles. Thus, it is not one of the larger categories in total people, but 434 of the jobs (98%) are identified as year-around. Only two titles, buyer and engineer, have enough people to be classified as major titles. Also frequent, however, are the titles of appraiser, chemist, forest ranger, market research analyst, and veterinarian.

The employers indicated that 105 new year-around positions would be added in this category, a 19% increase. This increase was fairly universal throughout the titles, with engineer and market-research analyst being the two with the largest actual number.

Educational requirements for entry in these jobs are high, of course. Of those interviewed in these titles, 41% have a bachelor's degree, with another 33% having completed at least some postgraduate work. Around 80% felt that at least a four-year college program is essential for entry, with about one-fourth of those feeling that an advanced degree is required. The veterinarians obviously need an advanced degree, and if they are removed the number feeling the need of advanced degree would be reduced to a negligible figure.

This greater educational requirement is also reflected in the breadth of subject-matter areas which are necessary. None of the subject-matter areas was marked unnecessary by even 50% of those interviewed in this job-title grouping. English and speech were felt to be highly necessary by over three fourths, mathematics by two thirds, and agricultural production, physical science, biological sciences, and business management by half or more. Engineering or mechanics was declared somewhat necessary by almost half (although engineers were almost unanimous for 'highly necessary,' as one would expect), with around 25% each in the higher 'necessary' and 'unnecessary' columns.

The type of agricultural production knowledge needed varies with the type of professional, of course, but the modal response is crop production, with 35% of the responses in this category. The next-most frequent responses were a nonspecific broad knowledge and ornamental and recreational plant production, while animal production received 16% of the responses.

Two thirds needed production knowledge to facilitate doing their job. Very few needed it because of direct involvement in production.

Almost 60% said they make middle-level operating decisions on the job, and another 20% are making most or all of the decisions concerning operations. Slightly over 50% of this group indicated that they make no policy decisions, although they make all policy decisions relative to their job.

None of the responses as to the difference between a good worker and an average worker were given often enough to establish a conclusive pattern. The most frequent response was experience or knowledge, but this was in slightly less than 30% of the cases. Desire for profit or success and dependability appear not to be factors, since respectively only 1% and 3% of the responses were in these categories. Hard work or effort, adaptability, interest or attitude, and human relations or responsibility were each mentioned about 14% of the time.

More than 3 out of 4 of these professionals are in government service, since all of the biologists, commodity investigators, entomologists, veterinarians, forest rangers, foresters, and, of course, agricultural commissioners and extension specialists are employed by government. Aside from the government, processing plants are major employers of agronomists, chemists, and market-research analysts; banks of appraisers; wholesale outlets of buyers; business associations of market-research analysts; and farm-machinery-and-equipment manufacturers and wholesalers of engineers.

Farm employers of professionals are well distributed throughout the larger operations in most of the farming SIC's, although veterinarians are found almost exclusively in 0722, veterinarian and animal hospitals.

Owner/Operators

The category of owner/operators is composed of those who both own

and operate their businesses; owners not directly involved in operating the business are not included. A second criterion besides involvement was also applied--that agricultural competencies were required. There were 1,076 positions listed that met these two criteria in the 1,181 firms which had at least one job requiring agricultural competencies. The number of firms which did not have owners meeting these criteria is actually larger than the difference indicated, for some firms listed more than one owner/operator.

Like those in the managerial category, the accessibility of occupants of these positions resulted in a high percentage of interviews (811, slightly over 75%). Identified in the interviews were 52 different types of owner/operators. The sufficient numbers of interviews obtained in six of these titles were sufficient that they were tabulated as individual titles: dairy farmer; citrus fruit grower; contractor, farm labor; seed, fertilizer, and insecticide dealer; fresh-produce dealer; and vegetable farmer. The rest were combined into the following groups: processing-plant owner/operators; service and supply company owner/operators; field-crop farmers; livestock, poultry, and general farmers; farm equipment dealers and repair-shop owner/operators; livestock dealers and processors; and flower and nursery growers.

Almost all of the owner/operators consider themselves in year-around jobs, with only 2% involved just seasonally. Most are male, with only the florists in the flower and nursery group having enough women owners to be over 10% female. A majority (54%) have been owner/operators for over 15 years. Their ages are over 40 years for 80% with approximately 20% being over 60. A majority have no more than a high-school education, and around 20% did not even complete high school. However, 19% have a college degree and 3% have done graduate work. Despite the variance within the group in educational attainment, no pattern is discernible.

The data suggest that the respondents generally feel more education is required now than they have attained. Approximately 70% feel that at least some education beyond high school is requried, indicating a higher requirement than the level attained by the present occupants. A majority feel this way in all titles and groups except for farm-labor contractors, where 52% feel that a high-school diploma is adequate and 11% do not even believe the diploma is necessary. Some college, or completion in a community college, is felt adequate by 31%, while 37% indicate a college degree. Either a four-year college degree or an advanced degree is felt necessary by a majority of citrus growers, farm feed and chemical dealers, fresh-produce dealers, vegetable farmers, flower and nursery growers, and processing-plant owners.

As with managerial and supervisorial personnel, this higher educational requirement is also reflected in responses on academic areas, for many of the areas are felt to be highly necessary by large majorities. 'Highly necessary' was the response chosen by over 60% of all owner/operators for business management (80%), labor management (73%), speech (68%), agricultural production (67%), business (64%), English (62%), and mathematics (61%). The response patterns were fairly consistent

in all these areas for all types except in the area of agricultural production. In this area, the responses ranged from 26% (for farm-machinery-and-equipment dealers and repair-shop operators) to around 80% (for the farmer titles).

Only 19% indicated that a nonspecific broad agricultural knowledge was necessary, while almost 50% of the responses were for crop production. Livestock and poultry production received 13% of the responses, although the frequency of response was naturally much higher in titles involved with livestock. Involvement in decision-making is, of course, much higher in this category than in the others for 83% make all operating decisions and almost 90% either make all policy decisions or participate in making them.

Miscellaneous Job Titles

A category was added to accommodate job titles which did not fit into the other catgories developed. Although 24 titles are included, only 235 actual jobs were listed, making it one of the smallest categories (only the forestry and timber group has fewer). Of the total, 31% are seasonal. None of the titles approached the minimum of 50 year-around jobs for classification as a major title. The year-around titles encountered most frequently are agricultural pilot and loan analyst, and the most common seasonal titles are flagger and loader.

Summary of Future Demand for Employees by Major Job Groups

Change in numbers of year-around employees was anticipated by 234 of the 1,454 firms responding to the statewide questionnaire (Form III). While the data in Table 30 cannot be used for statewide projections they confirm trend data from other sources. The projection of future demand by job titles, which was to have been obtained, is not forthcoming. Working with a statistician at Stanford Research Institute a random sampling procedure which took into account size of firms, and geographic distribution was designed and implemented. A proportionate random sample of over four thousand firms was drawn and each was contacted by questionnaire. When only forty per cent of the questionnaires were returned a second mailing (post cards) was initiated to validate the randomness of the original returns. It was at this point that it was found that there were serious errors in the size of firm data which had been obtained from the Disability Insurance Records, California Department of Employment. There was neither sufficient time nor resources to obtain a second listing of firms in agriculture for sampling purposes. The only alternative was to present the data from the returned questionnaires indicating that it represents only the firms which replied. Data from this group generally confirms projection information obtained during interviews with owners or managers of some 1,141 firms. These data were further reviewed by the industry--education advisory committee for the study--and they concurred that these data represent the trends abundantly evident in the agricultural industry.

This group of 683 firms indicated that the decrease in demand for laborers and low skilled jobs (-1,637 individuals) will be more than offset by the numbers required in the more highly skilled groupings (+2,056).

Table 30

FORM III
YEAR-AROUND EMPLOYEES WITH AGRICULTURAL COMPETENCE

Major Job Title Groups	# Job Titles	+ Increase - Decrease
1. Laborers, Production Agriculture	19	-1,637
2. Equipment Operator, Maintenance and Repair	16	+ 551
3. Processing Plant Workers	14	+ 33
4. Landscape and Nursery Workers	14	+ 260
5. Livestock Workers	2	+ 97
6. Sales Personnel	6	+ 206
7. Technicians and Quality Control	9	+ 42
8. Forestry and Timber Workers	-	-
9. Office Personnel	9	+ 164
10. Managerial-Supervisorial	15	+ 531
11. Professional	16	+ 103
12. Owner-Operators	4	+ 6
13. Miscellaneous	5	+ 8

234	Firms Indicating Change	34.2%
33	Firms—Don't Know or No Answer	4.8
416	Firms With No Change Expected	61.0
683		100.0%

It is highly unlikely that many of those who will be leaving the laborer category will qualify for other jobs in agriculture unless much more emphasis is placed upon adult education and retraining. Many of those in the grouping showing the greatest increase, managerial-supervisorial, will need preparation at the community college, four year state college or University level. The same is true for many entering sales and professional type of employment.

The data indicate that there will be increased demand for employees in 141 job titles in the 683 firms represented. Decreases will occur in 19 job titles. The two job titles in which the greatest increases are equipment operator and division foreman. Major decreases are primarily in the titles of laborer and other low level skill types of jobs. Other anticipated changes by job titles appear in Appendix D.

Educational Level Needed by Major Job Groups

It is recognized that there is a wide range in the educational preparation needed by the occupants in various job titles within most of the major job groupings discussed in this chapter. Yet a summary of the responses of employees in each of the larger groupings is of value to planners considering the job cluster approach to occupational educaiton. (Table 31). Preparation at the high-school level was believed adequate for job entry for practically all laborers and most jobs in processing plants, livestock operations, forestry, and in equipment operation. Community college is needed by about one third of those entering careers in sales, technician and quality control work, office occupations, or as owner/operators. A four year college or university degree is essential for about one third of those employed in sales, in quality control, in management, or as owner operators, The bachelors degree or graduate work is needed by most (80 per cent) of the professionals such as appraisers, food technologists, buyers, and agronomists.

Employees in the job groupings requiring special preparation such as in sales and technician work tended to say that entry into their job today required educational preparation one level above what they had. This could be interpreted to mean that the complexity of their job had increased significantly since they entered.

TABLE 31

EDUCATIONAL LEVEL NECESSARY FOR JOB ENTRY
(4,623 employees)

Job title group	Number	Educational level (percentages)				
		Less than high school	High school graduate	Community college or some college	College degree	Graduate work
1. Laborers in production agriculture	376	63	34	2	1	-
2. Equipment operation, maintenance, & repair	811	39	48	12	1	-
3. Processing plant workers	198	42	45	11	2	-
4. Landscape nursery	86	26	41	20	13	-
5. Livestock workers	149	49	38	11	2	-
6. Sales personnel	240	4	22	40	33	1
7. Technician & quality control	102	9	25	31	35	-
8. Forestry & timber	40	38	32	23	7	-
9. Office occupations	352	-	29	44	27	-
10. Management & supervision	1425	12	32	26	30	-
11. Professional	229	-	9	11	66	13
12. Owner-operators	311	6	23	31	37	2
13. Miscellaneous	104	18	22	29	31	-

Chapter VI

Conclusions and Recommendations

This section discusses the major points discovered in the three years of study of agricultural occupations in California, with their implications for education and training. Some support data are included here to aid in the summary, but most of the data and pertinent discussion which have led to these conclusions and recommendations are presented in the text of the report.

1) Historically, programs in vocational agriculture have been designed for those entering farming, with the focus on the needs of prospective owner/operators. That such a focus was justifiable in the past, even at the high-school level, is exemplified by the owner/operators interviewed. Many who answered a question about how far they had gone in school responded that they had not even completed high school, and 56% had gone no further than high school. At present and certainly in the future, however, the primary focus of any vocational curriculum below the four-year college level should not be preparation for farming or, for that matter, preparation to be an owner/operator. (This has been recognized for some time, although legal restrictions made much change difficult.) When surveyed in the course of this study, vocational educators in agriculture identified the passage of the Vocational Education Act of 1963 as the most important event in the last ten years, for it made it legal to expend federal vocational education funds for broadened programs.

It is true that not all owner/operators agree that college preparation is necessary, for almot 30% still feel that high school is the most required. There is not much doubt that such an opinion is unrealistic, however, when other data are examined. For example, over two thirds of all owner/operators feel that it is highly necessary to study in the broad academic areas of: Agricultural Production, Business, Business Management, English, Labor Management, Mathematics, and Speech. That list could also include Biological Sciences, Engineering or Mechanics, Language (usually Spanish), and Physical Sciences. An academic preparation in the depth indicated above cannot ordinarily be obtained through a high-school or community-college program.

This is not to intimate that students bound for owner/operator (and other management) careers will not benefit from vocaitonal agriculture at the high-school and community-college levels. The same rationale that provides high-school instruction in English, for example, applies to agriculture as well. The concern is that the emphasis in programs below four-year colleges be on preparation for entry into jobs. The ample need for the high-school program in agriculture is obvious from the bulk of this report.

2) The term 'agricultural competencies' as used throughout this report requires clarification. It discriminates between jobs within the realm of the educator in agriculture and other jobs. In effect, it

attempts to operationalize the concept of agriculture described in the section of this report entitled "Agriculture Today."

Agricultural competencies are defined as "those competencies which require knowledge or skill in one or more of the primary areas of plant science, soil science, animal science, agricultural business management and marketing, and agricultural mechanization." This definition was presented to the Adminstrative Advisory Board and the Liaison Committee and was accepted as being inclusive and valid. It does clearly broaden the scope of agriculture beyond farming, one of its major goals. Plant science and soil science, for example, are related as definitely to turfgrass care and culture on a golf course as to pasturegrass care and culture on a farm, and the raising of laboratory animals is as clearly under animal science as is dairy-cattle production.

The main operational problem arises from use of the term 'science' in the definition. As an example, there seems to be no doubt that weed control has its roots in plant science, and that a job involving application of chemicals to control or eradicate weeds requires agricultural competencies. Doubt arises, however, when the control is by means of a hoe in the grip of a man having a seasonal job as a field hand. Although knowledge of the difference between weeds and a cotton plant is not scientific, such knowledge is considered an agricultural competency for the purposes of this study, even though learning it does not require a formal course of instruction.

Another operational problem is posed by handling and processing workers. Food technology is an accepted agricultural science, but some food-handling and processing jobs are in the gray area between agricultural and nonagricultural skills. Hence, these jobs are not generally accepted as being agricultural. While this exclusion is accepted in this study, the discussion of jobs includes the ones in this category with reservations, since a precise method of separation is lacking.

Perhaps the most realistic way of operationalizing the concept of agriculture and (from that) agricultural competencies is to determine whether a knowledge of production is required. This too lacks absolute precision, but it would appear to have merit. Each interviewee was asked this question--whether or not agricultural production knowledge (defined on our form as plant or animal science) is highly necessary, somewhat necessary, or unnecessary. Since a three fourths majority responded that such knowledge is either highly or somewhat necessary, criterion would not have changed to any great degree the overall picture of who was interviewed. However, one category would probably have been changed drastically, since approximately 60% of the respondents in the handling and processing worker category, discussed just above as a doubtful inclusion, feel that agricultural production knowledge is unnecessary for entry into their job.

In summary, it must be recognized that agriculture is a very broad term, and that some imprecision remains even after operationalizing the concept through a definition of agricultural competencies. Even so, it is felt that potential error will be minimized if necessity for agricul-

tural production knowledge is used as a basis for selecting job titles for which agricultural education should be provided.

3) Throughout this study and discussion of the findings, year-around jobs and seasonal jobs were segregated. The emphasis is on year-around jobs, with only minor discussion of seasonal employment. Formalized institutional programs in agricultural education at any level are generally directed toward full employment for the student, rather than seasonal work. Some job titles are used for both year-around and seasonal jobs, with little to differentiate them other than the term of employment per year. This is true in all categories of jobs and at all levels, although the dual title role is more common in some categories than others, as indicated in the discussion. It is recognized some categories than others, as indicated in the discussion. It is recognized that students often work in a particular job title to gain experience on a seasonal basis, entering the job full-time upon graduation. It may well be that this practice could be carried out more extensively, with the stage of development of the student in academic work correlated more directly with the seasonal job he seeks.

4) On-the-job experience is deemed essential for entry by a large majority in every job title in which interviewing was conducted. If future employees are to be adequately trained, appropriate experience is essential in conjunction with classroom study. This is, of course, a time-honored precept of vocational education, and has been the heart of some college programs as well, but it would appear that a re-emphasis in this direction is currently in order.

Seasonal jobs during nonschool periods, as mentioned above, is only one way. Another is supervised work experience during school, closely tied to classroom work. This seems to be gaining momentum in many school systems, and some special funding is available through which pilot projects are being conducted.

Yet other methods of providing experience are the traditional supervised project as well as laboratory (such as school farm) experiences in connection with classroom instruction. The latter two methods have one major disadvantage in that neither provides the experience of job relationships, for the relationship is still one of teacher and student rather than employer and employee. There is only one way of getting employee experience--on the job.

5) A major problem encountered throughout the study was the lack of specificity in job titles. Throughout the agricultural industry, although less so in nonfarm than in farm businesses, job titles are not very definitive in terms of functions and activities performed on the job. This is a critical deficiency in developing training programs. If the future employee is to receive training which will meet the expectations of the employer, it is necessary to know what the job entails--not just for one employer, but for all.

This lack of specificity also contributes to another deficiency--lack of a defined career progression. This lack is exemplified by the response of almost one fourth of the employees (owner/operators)

that their job has no advancement potential. The fact is that a hierarchy of jobs does exist, though it is not defined and therefore is not well recognized by either the employer or the employee. Consequently, it is difficult to develop training programs which will help an employee move up in his chosen occupation. It is no surprise that 70% of those employees who did see some way of advancing on their job responded that on-the-job training is what is required.

As long as job titles lack specificity and there is no defined progression ladder, there will always be limitations on how specific and relevant training programs can be for any particular group of trainees. This is another variable limiting the effectiveness of education. Industry, not education, must take the initiative to change it.

6) Despite the limitations imposed by the lack of specificity of job titles, educators should review their programs to ensure that they are designed to meet the requirements of actual jobs rather than vague, generalized purposes. The programs designed in recent years, such as ornamental horticulture, do not seem to pose the problem to the extent that the more traditional programs in production agriculture do. Here there is little evidence that much thought is given to whether the program is designed for a tractor driver or a farm hand; the supposition is that although job titles are not mutually exclusive the preparation is the same.

On the other hand, knowledge about the changeable goals of students and the changeable needs of industry, coupled with limiting resources, dictate that programs should not be directed toward one specific job. The compromise, of course, is the development of curricula for a group of closely related jobs. This endeavor should be facilitated by division of the data of this study into various types of jobs.

7) A method by which planning for occupational preparation can be facilitated is through open communication between industry and schools. Evidence suggests that such communication may be lacking in many areas. Employers, for example, might express a need for a certain type of employee during one of the panel meetings in an area where a very good training program for that type of employee was in existence. Even a local industry advisory committee, which in itself does not ensure communication, is not present in some school districts. In other instances, employers express the need for qualified trained personnel yet wish to have little to do with the school system which might be able to supply them.

In other words, the deficiency is not a one-sided problem, though it may well be the responsibility of school personnel to initiate corrective action.

8) The number-one employee problem of employers is a lack of qualified workers. The major thrust of educational institutions is to meet this need through pre-employment education programs. However, another avenue, though one which received less emphasis, is through some form of continuing education. Continuing education, in addition to alleviating the shortage of qualified workers, should be the major method

of attacking the second-most serious problem, the need to train or retrain employed workers.

Educational institutions at all levels are involved in continuing (adult) education. High schools and community colleges offer short- and long-term courses, usually through an evening division, while the most extensive college involvement is throughout the Agricultural Extension Service. The extension service has long been a major source of agricultural information for keeping up to date. It is not, however, a source of training or retraining for the work force, although extension personnel are sometimes involved in instruction courses offered by some other institution.

A major need exists for an increased effort in adult education. Getting the latest information is a part of it, but even more important is the need for training, retraining, and upgrading of the personnel employed. It may be that businesses themselves will increase their own efforts in this regard, as some are doing now, especially in the agribusiness sector. The current economic situation in agriculture does not make this possibility very likely, however, and it appears that educational institutions must be the source of most of the increased effort.

The desirability of designing training programs to meet the demands of specific jobs, or job clusters, rather than the dissemination of general information, has been discussed previously in relation to pre-employment programs. This is not only desirable but necessary for in-service programs. It is also easier to accomplish since it eliminates the uncertainty of the student's occupational choice. In addition, the students are in a better position to make contributions to the content of the course, helping to ensure its relevancy. In fact, enrollment is impossible to maintain in an adult class if the course is not relevant to the needs of the students.

At present, the need is primarily for adult programs designed to improve the capabilities of employees to perform on their current jobs. It is hoped that the day will come when a more formalized career progression will be developed. At such time, adult programs in agricultural education can be designed to move an aspiring employee up to the next job in the progression.

There is need for bold new approaches in adult-continuing education. Few businesses have in-service education. Possibly the adult educator should go to the industry or farm and teach there, rather than expecting the often-reluctant customer to come to the school. In some cases it may be individual instruction for a short period; in others it may be group instruction over several weeks.

9) All the evidence of the study indicates that the number of jobs requiring agricultural skills and competencies is going to increase in the next 5 years. The magnitude of that increase cannot be stated with precision, even in a static sense, i.e., with economic and other variables held constant. In addition, variation exists between types of jobs, making a gross statement of increase that much more hazardous.

Nevertheless, the increase is definitely indicated. This statement contradicts those of agencies such as the Department of Human Resources, which predict a steady decline of agricultural workers.

The apparent contradiction arises for several reasons. Official agency statistics are given for a category usually composed of farmers and farm laborers. The Farm Laborer category is primarily seasonal in nature. Interview data taken only from this category would not indicate an increase either. The indication of future job increases comes from consideration of the broad spectrum of agriculture--agri-industry as well as production agriculture. Another major reason, is the sources of error inherent in any method of prediction. Official agency predictions are based on historical statistics, a method which is quite accurate as long as current trends continue. Changes in conditions, however, can make such predictions grossly inaccurate, as evidenced by the predictions concerning aero-space workers in California--none of which indicated the decrease in these jobs which occurred in 1970. The error in the survey method comes from the fact that employers either tend to project what they would like to see happen, not necessarily what will happen, or they tend to predict no change unless there is some definite and obvious reason.

The recommendation which naturally stems from the above conclusion is that there is an optimistic future in agricultural educational though the focus and program emphasis must change in many schools.

10) The largest increase in jobs, as well as the largest number of year-around jobs, is in the category of managerial, supervisorial, and foremen types of jobs. This is true in both production agriculture and agri-industry. It would appear the community college could provide training for the foreman and supervisorial level, while the four-year college could best provide training for managerial job levels.

It is therefore recommended that preparation for this type of job receive more direct emphasis than is currently the case. Farm Management, Farm Business Management, or Agricultural Business Management are all frequently curricula in four-year college agricultural programs, so needs in jobs requiring this level of education may be being met. There is too little emphasis on this type of curriculum at the community college, especially in terms of the requirements for specific jobs. The emphasis is too much a carryover from when such programs were designed to give training for owner/operators.

11) Two areas of academic training for managerial, supervisorial, and foremen jobs warrant special consideration: labor management and business management. Labor management is felt to be highly necessary by the majority of respondents in every job title except one, Director, yet it is seldom even mentioned in most agricultural-education programs. Although slightly less than a majority of the respondents feel that business management is highly necessary, the percentage is lowered because of the inclusion of foremen titles. Majorities in all of the managerial and supervisorial titles feel it is highly necessary. Although agricultural curricula, especially in four-year colleges, give

more emphasis to agricultural business management than to labor management, it still may not receive the attention the respondents indicate it should.

12) The second-largest group of year-around jobs, and the second-largest group of predicted new jobs comprises titles associated with equipment operation, maintenance, repair, and construction.

Jobs in this category which involve repair probably require training at the community-college while the operation and maintenance jobs require high-school-level training only. Agricultural Engineer is included in the professional category rather than that under discussion here, and requires at least a four-year college degree.

The need for people to fill these jobs appears to be widespread enough that training should be available in most areas of the state, if not all. In addition to the need for specific training for mechanical jobs, it is obvious that practically all year-around jobs directly involved with production agriculture require the operation of equipment and machinery, which should therefore be included in the training for jobs in other categories.

It is recommended that agricultural mechanics be given strong emphasis in curricula throughout the state. Emphasis should be on operation and minor repair at the high-school level, and on major repair at the community-college level. In addition, curricula developed primarily for agricultural equipment job training should always include production-agriculture courses. This is especially true for those operating equipment in the field. A substantial majority interviewed felt that production information was either highly or somewhat necessary. The majority of those involved primarily with repair did not share this feeling, stating that production knowledge is unnecessary. The pattern is then reversed again by engineers, where almost 80% feel that such information is either highly or somewhat necessary.

13) The next-largest category of jobs involves sales personnel, and rate of growth in this category is expected to be almost twice that in the mechanics area. According to the interviewees, the community college should be the center of effort for jobs in this category, although specific titles do show some variance. Needs for clerks and in-store salesmen can probably be met by high school, while sales managers, at least, require a four-year college program. In addition, some fieldmen feel a need for a college degree, but the nonspecificity of this title clouds the issue.

Curricula for some of these jobs should definitely include courses in production agriculture. This is highly necessary for jobs involving field salesmen, at least in the view of a majority of occupants of the jobs. Such information may not be as vital for clerks and store salesmen, but even in these titles, very few felt that such study was unnecessary. The type of knowledge required varies with the job, but almost half of the sales personnel interviewed indicated that a knowledge of crop production was necessary in their jobs, while another one fourth indicated they needed a nonspecific broad knowledge of agriculture.

14) The fastest growing category of jobs is in the landscaping and nursery segment of the industry, with almost a 30% increase forecast by employers over the next 5 years. This has also been a rapidly growing area of instruction in recent years, and there is certainly nothing to indicate that this growth in instructional programs should slow down, nor should further modifications of existing programs be ignored.

Not only do the employers interviewed project an increase in the number of people they employ, but there are other indications of an increase. New job demands are created by the landscaping of private homes, the development and maintenance of city parks, and even shopping centers. Growth, not stagnation, is implicit in the development of open space in suburbs and the need for golf courses and other recreational areas. Programs in this area of study should be restricted to population centers, for there would appear to be few geographic areas where there is not at least some demand. Sparsely populated areas should be carefully checked, however, before a program is started.

This category is largely composed of jobs requiring no more than high-school preparation. Some exceptions are such titles as Landscape Consultant, Landscape Architect, and Landscape Gardener, which require college degrees. Although some respondents in all job titles indicated that a community-college program was what was required, this feeling was not expressed by a majority in any title. Supervisory personnel feel that training at the community-college level is necessary, in most cases, for their jobs--especially in ornamental plant production.

15) The inclusion of office personnel by many employers in the category of "those who need agricultural skills and competencies" was not anticipated. The workers themselves seemed to dispute this judgment, for only 16% feel that agricultural production is an area of academic training which is highly necessary. Even so, a figure as high as 16% may be surprising to some and takes on added significance when added to the 43% who feel agricultural-production training to be somewhat necessary. The reason given by two thirds of those responding this way is that it facilitates doing one's job, indicating that little depth of knowledge is required.

Certainly no strong recommendation is in order that an agricultural course be available for office personnel. A familiarization type of course, however, might be appropriate in some highly agricultural areas where graduates of business courses are employed in agricultural firms. It might also be examined as a possible adult-school class in some areas.

16) There is little evidence to support widespread expansion of curricula to prepare for jobs in forestry, timber, and lumber. Part of the lack of evidence may arise from a sampling procedure that inadequately sampled businesses which might hire such personnel. That is, in only a single county used in the interview procedure would one expect to find such jobs. Even in this county, however, the numbers of such firms were not extensive. A possible exception might be found in logging

and timber, but the jobs requiring agricultural competencies appear limited even here. This statement includes a new type of business, Christmas-tree farms. Although gaining momentum, this is not a type of business which employs very many people for any great period. It will not materially increase the number of job opportunities, at least in the near future.

Two titles, Forest Fire Technician and Forestry Technician, appear in the Technician category, though not in numbers large enough to improve the picture presented by the data for the category under discussion. The same is true in the professional category, which includes Forest Ranger, Forester, Park Naturalist, and Silviculturist, though not in large numbers.

Since the possibility exists that the sampling procedure caused an error in the data with regard to this job category, no definite recommendation is made. However, the cautionary statement must be made that a careful analysis should be performed of the job potential in any given area before a program for jobs in forestry is developed. The demand does not appear to be great enough to support even a mild increase in programs. Rather, programs might be strengthened in areas where forestry is important to the economy.

17) Two job categories, technicians and quality-control personnel and professionals, are relatively small categories presenting special but similar problems. Quality-control jobs include a wide range of skill levels, from field grader of fruits and vegetables (requiring minimum training) to food-processing-plant quality-control personnel (requiring specialized training). Technicians are specialists in the technical details of an occupation who usually require some knowledge of laboratory technique. Professionals are, of course, leaders of an occupation and usually possess the knowledge and ability to carry out research programs or render decisions at the top management level. Because of the highly specialized nature of quality-control technician and professional occupations, general conclusions and recommendations are hazardous to make. Community colleges are the source of most of the training for technicians and quality-control people, while the four-year colleges are the source for professionals, with no change indicated for the future. It does not appear that programs for either group should be expanded, although needs may exist in limited areas. If such local needs are found, then programs should be developed, but statewide needs do not seem to justify such development.

18) Jobs in which the occupants are involved with livestock and small animals compose a fairly small category, and one for which only a moderate increase is anticipated. In addition, few of the occupants of jobs not directly related to animals seemed to feel that knowledge about animals is necessary for their performance. Nevertheless, livestock production has been, and still remains, a popular curriculum in schools at all levels.

Despite this apparent imbalance, a recommendation for drastic alteration of the situation is probably inappropriate for at least three

reasons. First, at least some type of animal production exists almost everywhere, including cities, where the production and care of small animals may be a big business, both for pleasure and for use in laboratories. Second, the curricula are popular with students and often help sustain interest while they move into other areas with more job potential.

Finally, many students have little opportunity to learn about animal production in their current home environment, whether on farm or off. Introductory courses in livestock at the high-school level can be easily justified vocationally, at least if they provide the knowledge and skills necessary for apprentice jobs. These jobs (under the titles of Farm Hand, Livestock; Farm Hand, General; and Farm Hand, Poultry) are listed almost as frequently as all other year-around jobs involving livestock and animals combined.

Even though it is therefore inappropriate to make a general recommendation to reduce the livestock and animal course offerings, it must be emphasized that employment opportunities are not plentiful that require animal production knowledge and skills, at least beyond those which can be learned in basic courses.

19) Handling and processing-plant workers are another relatively small group, at least for year-around jobs, with only a modest increase anticipated. Seasonal jobs are much more numerous, second only to farm-labor jobs. Yet the development of preparation for seasonal jobs is not recommended unless these lead to year-around employment. Low numbers, combined with the fact that agricultural competencies are of marginal necessity for many of these jobs, mandate that a careful study be made of local conditions before a program is considered for preparing students as handling and processing-plant workers.

20) The situation with regard to farm laborers requires clarification. The vast majority of these jobs are seasonal, and therefore are not appropriate for consideration in the development of curricula, although short-term adult courses may be appropriate. In addition, there was doubt throughout this study as to whether consideration should be given even to the year-around jobs in this category. This doubt arose from the feeling that agricultural competencies were not required for these jobs, which call for only a very low level of skill and knowledge. Some employers did not list farm laborers, because they felt they needed very little knowledge about agriculture.

Nevertheless, they are included. First of all, not all these jobs are seasonal. The knowledge and skills required are only minimal and can be learned without formalized training, but employability is enhanced and prospects for moving on to other jobs are improved, even for a high-school dropout, if the knowledge and skill are learned beforehand. As indicated for the farm-hand titles associated with livestock, introductory or basic agricultural courses can provide the learning experiences necessary for these jobs. If the student goes on, he builds on these courses, which is expected, of course. If he drops out, however, he at least has a basis for employability in a year-around job and is not automatically relegated to seasonal employment by default. Therefore,

introductory courses should not be designed just as prerequisites to advanced work, but should also be designed to teach the knowledge and skill required for farm-hand jobs.

Chapter VII

Pertinent Implications

Implications and guidelines for planning are given for each of the levels at which education in agriculture is offered. These guidelines are with the assumption that there will be a continuing effort to facilitate articulation among the offerings at the various levels.

HIGH-SCHOOL AGRICULTURAL COURSES. In spite of statements often heard in uniformed circles, agricultural education at the secondary level is not dying out--nor should it. High-school enrollment increased during the period covered by this study from 20,900, in 265 departments in 1967-68, to 31,928, in 275 depatments in 1970-71. All indications from this study are that continued increase is appropriate.

One historic emphasis of high-school courses should not continue--if it exists even now. The data all reinforce the already widely accepted idea that at the high-school level--or even community-college level--the education is not sufficient for the preparation of owner/operators either in farming or in some other area of agriculture. Therefore, no program below the state-college level should focus on such preparation.

High-school courses should be focused upon two major objectives. One includes the very important task of helping students start to understand basic concepts, principles, practices, and mechanics of agriculture. This should include an opportunity for introduction to the processes in farming and in agricultural business, from the growing of plant and animal through processing and distribution. Some students may use this initial preparation as a basis for job entry, while others may base future occupational education upon it. The second objective should be preparation focused upon direct entry into an occupation. The latter should include emphasis on preparation either for entry into a job or, possibly more appropriately, a cluster of jobs. An analysis of job functions suggests that although 340 different jobs were found in agriculture, most of the employees (80 per cent) are in one of 57 titles. These, in turn, can be grouped into 13 major classifications or clusters. For example, a high school might decide, because of employment opportunities, to give preparation for the major job classification (cluster) of equipment operation, maintenance, and repair. The high school could teach for entry level into machinery operation and maintenance jobs, while the teaching of major repair and overhaul would possibly be more appropriate in the community college.

Many job-entry (employment) skills needed in agriculture can still be taught at the high-school level. Examples include welding, plant propagation, operation of tractors and other farm machinery, handling and care of livestock, maintenance and operation of small gasoline engines, simple building construction, and introductory preparation in management, to name but a few. The secondary school also offers the opportunity for work experience during the regular school year as well as during the summer. Experience on the job is given as essential for job entry by 80 per cent of the nearly 5,000 workers interviewed.

This type of preparation, which has been a required part of vocational agriculture for over half a century, must be continued and extended.

The potential role of agriculture in career education should be studied by teachers of high-school agriculture. The adoption of career education has the potential of bringing to all occupationally oriented education the status and support it has long deserved.

This study also indicates that the high school is well equipped to help teach employability assets (such as initiative, responsibility, and dependability) through its early contact with the student in Future Farmers, in farm and nonfarm work experience, and in participation in fairs, shows, and other leadership training activities.

A majority of the high-school agriculture programs are still production-oriented. This emphasis has recently expanded to include ornamental horticulture, forestry, natural resources, and recreation. This direction should be continued, with increased emphasis upon introduction into business, sales, and management-supervision training. Skill in supervising other workers was the function ranked first in importance by workers in each of the 13 job clusters.

While most high schools with agriculture have mechanics offerings, this aspect of the preparation is far from its potential. Skills in construction, maintenance, repair, and operation of equipment were rated second in importance among the 22 major functions identified, yet less than one fourth of the students in vocational agriculture identify a specialization in agriculture mechanics.

The ratio of teachers to students has not kept pace with the increase in enrollment in agriculture from 14,000 to 32,000 in the past ten years. This raises some very vital questions and concerns, such as: Can quality of instruction be maintained with, in many instances, a doubling of the limit of 15 to 20 students per class in vocational agriculture? Can adequate supervision be given in on-farm and off-farm work experience when the ratio of students to teacher has in many instances doubled form the former ratio of 45:1

The high schcol will continue to play an indisputed role in preparation for employment in agriculture. It can help the student begin to develop and understanding of the basic biological processes in plant and animal growth. It can provide realistic, practical work experience and can teach many employment skills to a job-entry level. Possibly even more important, it can play a vital role in the development of employability skills which are so essential to job success.

COMMUNITY-COLLEGE AGRICULTURAL CURRICULA. These have two basic functions. The first, and perhaps the most important in terms of numbers of students served, is the preparation of individuals for job entry at the technician level in production and agribusiness sectors of the industry. The second is the preparation of individuals for advanced agricultural study at the four-year college level.

Articulation between agriculture taught in high schools, in state colleges, and in the university becomes increasingly important with advances in agricultural technology and increases in agricultural enrollments. But whether the student who has had agriculture in high school should bypass introductory courses in agriculture in a community college is a question not satisfactoryily answered in general. The question also remains as to what extent transfer courses should be equated with supposedly equivalent courses in state colleges.

Most concerned citizens agree that the community college should continue to take a greater role in preparing technicians for agriculture and para-professionals for quality control and other fields. But care should be also taken that there is reasonable opportunity for placement of those properly prepared. This seems to be particularly critical in forestry and natural resources, where job opportunities are currently few.

Master planning of specialty vocational programs in agriculture (possibly on a regional basis) is now beginning and should be extended. Resource shortages (including facilities, adequately trained teachers, funding, and adequate enrollment) demand that certain costly specialty programs in agriculture, such as artificial insemination or horseshoeing, be cooperatively sponsored by a number of community colleges.

The equipment operation, maintenance, and repair-job group offers one of the highest potential labor demands for new employees. It contains the jobs for which it is most difficult to find qualified employees, and acquiring the skills and knowledge needed in this field was listed as an important part of preparation by 44 per cent of the 4,593 employees interviewed. Sixty of the 511 employees interviewed in this job grouping reported that community-college preparation in the broad area of mechanics and agricultural engineering would be important for entry into their jobs. Yet such preparation is offered in only 12 institutions and enrolls only 242 students (less than 4 per cent of the 6,366 student enrollments in agriculture). Four times as many students are in forestry, natural resources, and related programs where opportunity for placement is not nearly as promising.

The need for preparation in the management of resources, both monetary and human, was listed as essential by over 60 per cent of the employees interviewed. One fourth of those in the manager-supervisor or foreman category (1425 individuals) and one third of the owner-operators (811) stated that relevant study in a community college was required for job entry; 40 per cent of those in sales (240) agreed with this. Yet only 18 community colleges listed courses in agricultural business, and only 1 offered agricultural sales. Three courses in nursery-floral shop management were listed--but there were no courses concentrating on labor management problems. This is particularly critical because collective bargaining is on the horizon.

Animal science as an identified course appears in only four colleges, although some of this science may be taught in 14 colleges offering animal production courses. This is possibly in line with job demand, since the need for competence in animal science was listed as important by only 12 percent of employees interviewed (while 36 per cent declared knowledge of plants essential.)

The growing need for workers for the landscape-nursery industry is being recognized by community college--there are course offerings in this field in two thirds of the institutions surveyed, and in several colleges preparation includes courses identified with management and maintenance. About one fourth of workers interviewed in the industry indicated that community college was essential preparation.

Community-college agricultural courses are important but are nowhere near their indicated potential for providing workers with needed skills and knowledge. Some community colleges will possibly need to decrease their emphasis on certain types of preparation in agriculture which may be available in feeder high schools and to concentrate their limited resources on higher-level preparation and in courses in resource management (including labor).

Although no need has emerged for workers to deal with problems of agriculturally related environmental concerns (such as water pollution), community colleges should even now be studying and defining the role which agricultural programs can play in preventing catastrophe in this vital area.

STATE COLLEGE AND UNIVERSITY AGRICULTURE. Program modifications to meet new demands in agriculture have moved faster and further in colleges and universities than lower educational levels. There is a continuing need for four-year institutions to concentrate on preparation of those who will manage agricultural industry, both on and off the farm. Of the 234 professionals interviewed, two thirds indicated that four-year college preparation was essential, as did one third of the 240 in sales, the 97 in quality control, and the 1,425 in management supervision. Owner/operators also emphasized that a baccalaureate degree was becoming more essential. It might be expected that the above is an underestimate, for the percentages given are more than double those with four-year college preparation currently in those positions. Ordinarily, an employee is reluctant to state that he is undereducated for his position.

Of the nearly 2,500 people interviewed in managerial, professional, and owner/operator classifications, three fourths listed proper business administration and personnel supervision as essential to success on their jobs. Although teaching these may not be the responsibility of the colleges concerned with agriculture, study in these areas should become a requirement for anyone preparing for leadership in agriculture. Labor laws and labor relations and negotiations are rapidly becoming a new necessity for agricultural management, to say nothing of business management.

Colleges of agriculture in the state-college and university systems are rapidly developing programs focused upon natural-resource utilization, resource management, and environmental concerns. While no one can question society's need for emphasis upon these, the apparent interest of the public has not been matched by sufficient funds to do anything about the paroblem. Students interested in formally studying ecological problems must therefore be cautioned that, for the present at least, jobs in these areas are not plentiful.

There is a continuing need for competent personnel in crops and livestock production, and it appears that the state colleges and university will continue to accommodate that need. Even so, both of these institutions should concentrate on preparing individuals with sufficient expertise to cope with all the management problems facing agriculture. To achieve that end, both institutions should continue to evaluate current programs and develop procedures which identify instructional needs related to changes in industry and technology.

APPENDIX A

Data Collection Instruments

Form I: Firm Interviews

A STUDY OF AGRICULTURAL EDUCATION IN CALIFORNIA

Date _____

Interviewer _____

1/1-4 1. Name of firm _____

2. Address _____

5 3. County _____

4. Telephone _____

5. Name of person interviewed _____

6. Position of person interviewed _____

6-9 7. SIC No. _____

8. Major functions of the firm, including a listing of products, goods, and/or services. (In the case of a farming operation, include the number of acres devoted to each crop, number of livestock, etc.)

10-11 _____

_____

_____

_____

_____

_____

12 9. Number of years the firm has been in business in this county? (Check one)

_____(0) 1 or less
_____(1) 2 - 3
_____(2) 4 - 5
_____(3) 6 - 7
_____(4) 8 - 10
_____(5) 11 - 15
_____(6) 16 - 20
_____(7) 21 - 30
_____(8) Over 30

10. Total number of persons in firm at this address: (Include owners if they are actively engaged in the operation of the business, but exclude stockholders or other absentee owners).

13 10a. Year round _____

14 10b. Seasonal _____

Total number of above persons who need agricultural skill or knowledge:

15 10c. Year round _____

16 10d. Seasonal _____

IF BOTH 10c AND 10d ARE ZERO, DISCONTINUE INTERVIEW. ALL FURTHER QUESTIONS ARE ASKED ONLY ABOUT THOSE EMPLOYEES WHO NEED AGRICULTURAL SKILLS OR KNOWLEDGE IN PLANT, ANIMAL, OR SOIL SCIENCE, AGRICULTURAL MECHANIZATION, OR AGRICULTURAL BUSINESS MANAGEMENT OR MARKETING.

93

10e. Job Titles of employees with agricultural skill or knowledge:

Year Round Job Title	No. of Persons in This Job Title Now	 5 Years From Now	 Net (+ or -)	Typical Tenure (years)	Average Salary $/Month (OPTIONAL)
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					

Total (Must = 10c.) .....____

Seasonal Job Title	No. of Persons in This Job Title Now	 5 Years From Now	 Net (+or -)	Average Salary $/Hour (OPTIONAL)
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				

Total (Must = 10d.) .....____

11. What is the firm's primary source of employees? (Place appropriate numbers from the right-hand column in the blanks behind the types of workers in the left-hand column.) OMIT IF THERE ARE NO EMPLOYEES.

17-18	Unskilled _____	1	High schools
19-20	Semi-skilled _____	2	Junior colleges
21-22	Skilled _____	3	Colleges
23-24	Office _____	4	Within the company
25-26	Sales _____	5	Government employment services
27-28	Supervisorial _____	6	Trade schools
29-30	Managerial _____	7	Labor contractors
31-32	Technical _____	8	Other (list) _____
33-34	Professional _____	9	Other (list) _____

12. What are the sources that the people in this firm use to obtain information to assist them in keeping up-to-date in their work? (Rate in order of importance, i.e. 1, 2, 3, etc.)

35	_____	Agricultural schools (including night classes)
36	_____	Extension service publications
37	_____	Company training programs
38	_____	Company publications
39	_____	Fieldmen or salesmen
40	_____	Magazines or trade publications
41	_____	Radio or T.V.
42	_____	Trade or professional organization
43	_____	Other (list) _____

13. What is the educational program of the firm? (Check) OMIT IF THERE ARE NO EMPLOYEES.

44

_____ (1) Conducts own program on regular basis
_____ (2) Conducts own program on irregular basis
_____ (3) Sends employees to company training program
_____ (4) Provides for and encourages participation by employees in public school programs
_____ (5) Does not have one
_____ (6) Other (list) _____

14. The listing below is of employee problems encountered by various businesses. How much of a problem is each item to this firm? (Check) OMIT IF THERE ARE NO EMPLOYEES.

		A Serious Problem (1)	Somewhat of a Problem (2)	No Problem (3)
45	a. Health & illness			
46	b. Accidents			
47	c. Insurance			
48	d. Absenteeism			
49	e. Turnover of employees			
50	f. Need to train or retrain			
51	g. Time to do necessary retraining			
52	h. Qualified workers not available			
53	i. Lack of qualified personnel to train employees			
54	j. Employee attitude toward work			
55	k. Labor union problems			
56	l. Retaining qualified workers			
57	m. Employing part-time workers			
58	n. Other (list) _____			

59 15. Do you feel that the number of employees in this firm will increase, decrease, or remain about the same in the next 5 years? (Check)

_____ (1) increase
_____ (2) decrease
_____ (3) remain the same
_____ (4) other (list) _____

60 16. What factors are believed to account for differences between current and anticipated employment during the next 5 years? (Check)

_____ (1) automation
_____ (2) mechanization
_____ (3) change in volume of business
_____ (4) no change
_____ (5) other (list) _____

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Form IIA: Employee Interviews

A STUDY OF AGRICULTURAL EDUCATION IN CALIFORNIA

Date _____

Interviewer _____

_____ 1. Name of Employee _____

5/1-5 2. Name of Firm _____

6-9 3. County _____

10 4. SIC No. _____

11-14

15-16 5. Job Title _____

17-19 6. Year Round or Seasonal? (Check)

20

_____ (1) Year Round _____ (2) Seasonal

_____ 7. Number of years in this job title? (Check One)

21

_____ (1) 1 year or less _____ (5) 5
_____ (2) 2 _____ (6) 6 - 10
_____ (3) 3 _____ (7) 11 - 15
_____ (4) 4 _____ (8) Over 15

_____ 8. Male or Female

22

_____ (1) Male _____ (2) Female

_____ 9. Age? _____

23

_____ 10. Last grade of formal school attended? (Check One)

24

_____ (1) Less than 8th grade _____ (5) 13th - 14th (College freshman, sophomore)
_____ (2) 8th grade
_____ (3) 9th - 11 th grade _____ (6) 15th (College junior)
_____ (4) 12th grade _____ (7) 16th (College graduation)
_____ (8) Postgraduate

(NOTE: Questions 11, 12, and 13 refer to JOB ENTRY)

_____ 11. Education necessary for entering the job. (Check One)

25

_____ (1) Less than high school graduation
_____ (2) High school diploma
_____ (3) Junior college or some college
_____ (4) College degree
_____ (5) Advanced degree

_____ 12. Experience necessary for entering the job. (Check One)

26

_____ (1) None required
_____ (2) On-the-job training
_____ (3) Apprenticeship
_____ (4) Journeyman
_____ (5) Other (list) _____

97

98

27 13. Limitations on entering the job. (Check One)

_____ (1) License or certificate
_____ (2) Labor union membership
_____ (3) Physical (strength, etc.)
_____ (4) Age
_____ (5) Other (list) _____

28 14. Requirements to advance in the job. (Check One)

_____ (1) No advancement potential
_____ (2) On-the-job training
_____ (3) Firm or trade school
_____ (4) Adult education
_____ (5) Vocational School
_____ (6) College
_____ (7) Other (list) _____

15. Listed below are some areas of education and training. How necessary is each one to a worker in your job, when he first begins the job? (Check one column for each item)

		Highly Necessary	Somewhat Necessary	Unnecessary
29	a. English (written)	_____	_____	_____
30	b. Speech (oral)	_____	_____	_____
31	c. Mathematics	_____	_____	_____
32	d. Cultural background (literature, history)	_____	_____	_____
33	e. Physical sciences (chemistry, physics)	_____	_____	_____
34	f. Biological sciences (biology, botany)	_____	_____	_____
35	g. Business (accounting, bookkeeping)	_____	_____	_____
36	h. Business management (management, organization)	_____	_____	_____
37	i. Labor management	_____	_____	_____
38	j. Agricultural production (plant or animal science) **	_____	** _____	_____
39	k. Engineering or mechanics	_____	_____	_____
40	l. Language (list) _____	_____	_____	_____
41	m. Other (list) _____	_____	_____	_____

** What part of agricultural production is necessary, and what is it about your job that makes it necessary? _____

42-43 _____

_____

44-45 16. What do you like most about this type of work? _____

46-47 17. What do you dislike most about this type of work? _____

48-49 18. What operating decisions do you make on this job? _____

50-51 19. What policy decisions do you make on this job? _____

52-53 20. In your opinion, what makes the difference between a good and an average holder of your job? _____

Brief Job Description: _____

Comments: _____

5
80

INTERVIEWER'S COPY

Form IIB: Employee Interviews

A STUDY OF AGRICULTURAL EDUCATION IN CALIFORNIA

Functions Performed in Job Title

Page		A Now	B Future
2.	Administration and Management		
3.	Supervision of Personnel		
4.	Consultation and Advisory (with persons in other firms)		
5.	Research and Development		
6.	Communications and Writing		
7.	Sales		
8.	Purchasing		
9.	Inspection, Enforcement, Regulation, and Control		
10.	Education - Extension Work		
11.	Clerical - Office		
12.	Public Relations		
13.	Growing of Plants (Soil preparation to harvest)		
14.	Livestock and Poultry Production		
15.	Construction, Maintenance, Repair, and Operation of Agricultural Machinery, Equipment, and Facilities		
16.	Handling Agricultural Materials (Transference, Packaging, and Storing		
17.	Processing and Packing Agricultural Products		
18.	Marketing Agricultural Products		
19.	Development of Air, Land, and Water Resources		
20.	Environmental Horticulture (Landscapes, Gardens, Flowers, Ornamentals)		
21.	Forestry, Range, and Wildlife		
22.	Recreation, Parks, and Scenic Beauty		

100

Administration and Management

1. MAKE OR FORMULATE POLICY - Create or develop governing principles, plans, or guidelines . . . . . .

2. PROMOTE - Stimulate and encourage programs, projects, and related activities . . . . . .

3. PLAN - Formulate goals, objectives, and guidelines for future action; devise, design, and project methods, systems, manners, arrangements, way and means . . .

4. COORDINATE - Relate and integrate various aspects of programs and activities . . . . . .

5. ORGANIZE - Allocate resources and arrange elements into a functioning unit - systematize . . . . . .

6. EVALUATE - Determine the value of -- assess, rate, judge . . .

7. FINANCE - Provide or arrange for funds, capital, or credit (for firm or customers) . . . . . .

8. NEGOTIATE - Confer with another so as to arrive at the settlement of some matter -- bargain, contract . . . . . .

101

Supervision of Personnel

1. Interview prospective employees . . . . . .

2. Hire new employees . . . . . .

3. Orient new employees to their job . . . . . .

4. Train new employees . . . . . .

5. Retrain experienced employees . . . . . .

6. Direct the efforts of others . . . . . .

7. Develop and maintain a high level of morale . . . . . .

8. Hear and process worker grievances . . . . . .

9. Inform personnel regarding firm policy, plans . . . . . .

10. Improve the level of worker performance and stimulate growth and development of workers . . . . . .

11. Rate (Evaluate) personnel in terms of performance . . . . . .

12. Terminate employment of workers when necessary . . . . . .

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Consultation and Advisory

Provide others (in another firm or business) with expertness and information; recommend, inform, counsel regarding:

A. Planning and decision making (policies, procedures, programs and techniques)

1. Policy formulation to guide overall actions . . . . . .
2. Definition of purpose of program . . . . . .
3. Setting goals and objectives . . . . . .
4. Determining ways and means . . . . . .
5. Identification and inventory of resources (human, material, natural, capital) . . . . . .
6. Recognition of limitations, problems and obstacles . . . . . .
7. Establishment of priorities . . . . . .
8. Allocation and organization of resources . . . . . .
9. Evaluation . . . . . .

B. Operational and technical details regarding:

10. Production . . . . . .
11. Agricultural mechanics and engineering . . . . . .
12. Handling, transporting, and marketing of agricultural products . . . . .
13. Conserving, developing, and improving air, land, and water for agricultural purposes . . . . . .
14. Developing and maintaining rural recreation and aesthetic resources . .
15. Agricultural business management . . . . . .
16. Accounts, records, bookkeeping budgets . . . . . .
17. Finance, credit, taxes, banking, insurance . . . . . .
18. Public relations . . . . . .
19. Human relations . . . . . .
20. Labor . . . . . .
21. Law . . . . . .
22. Management . . . . . .
23. Real estate . . . . . .
24. Education . . . . . .
25. Research . . . . . .

Research and Development

A. IDENTIFY PROBLEMS AND SET GOALS OF RESEARCH

1. Identify problem areas . . . . . .

2. Plan a course of action . . . . . .

3. Prepare guidelines for research development . . . . . .

4. Determine and assign priorities . . . . . .

B. DESIGN AND DEVELOP THE RESEARCH PROPOSAL

5. Identify assumption, presuppositions, value judgments implicit in the treatment of the problem . . . . . .

6. Develop criteria of evaluation and of admissible evidence . .

7. Select methods appropriate to investigation . . . . . .

8. Determine the basis for selection and interpret relation of data . . . . . .

C. CONDUCT RESEARCH

9. Develop new techniques, procedures, and devices . . . . . .

10. Use physical, chemical, and biological principles and techniques to create new applications of service or product . . .

11. Determine why there has been success or failure . . . . . .

12. See if something works by experiment or trial . . . . . .

13. Identify and recognize various elements of situations, conditions, and circumstances . . . . . .

14. Obtain pertinent information relevant to particular situations, conditions, items, and circumstances . . . . . .

15. Determine the extent, size, nature, value of . . . . . .

16. Make an examination, check or test against established standards . . . . . .

17. Make determinations by mathematical means . . . . . .

D. EVALUATION - Critical study of ideas, materials, or methods involving appraising, rating, or examining; evaluate results

18. Appraise the results of research . . . . . .

19. Recommend action as a result of evaluation . . . . . .

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A. GATHER, PREPARE, EDIT, AND DISSEMINATE GENERAL AGRICULTURAL INFORMATION AND NEWS

1. Written Form: Newspapers, magazines . . . . . .

2. Audio Form: Radio, television, telephone, records, tapes . . .

3. Pictorial Form: Television, film strips, slides, movies, paintings, photographs, sketches, graphs . . . . . .

B. GATHER, PREPARE, EDIT, SUBMIT, AND DISSEMINATE TECHNICAL AGRICULTURAL INFORMATION, FINDINGS, DATA, ETC.

4. Writing reports and accounts; texts and reference books; circulars, pamphlets, brochures, and bulletins; and articles for technical journals . . . . . .

5. Writing study guides, outlines, handbooks, and training manuals . . . . . .

6. Audio Form: Radio, television, telephone, records, tapes . . .

7. Pictorial Form: Television, film strip, slides, movies, paintings, photographs, sketches, overlays, graphs . . . . . .

C. GATHER, PREPARE, EDIT, AND SUBMIT FIELD DATA

8. Gathering and recording field data . . . . . .

9. Writing reports for submission to higher authority . . . . . .

D. PUBLIC TALKS, LECTURES, EDUCATIONAL VISITS

10. Making public talks, lectures, and/or educational visits . . .

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Sales

A. SET GOALS AND DEVELOP SALES PROGRAM

1. Plan a course of action . . . . . .

2. Prepare guidelines for sales program . . . . . .

3. Acquire product knowledge or skill competence . . . . . .

4. Identify target groups and individuals . . . . . .

5. Develop information regarding prospective customers' needs for product or service . . . . . .

6. Learn and use selling techniques based on accepted principles and practices . . . . . .

B. PROMOTE AND ENCOURAGE THE ADOPTION AND USE OF SPECIFIC GOODS AND SERVICES

7. Advertise: Display, exhibit, publicize . . . . . .

8. Demonstrate: Show, explain, illustrate . . . . . .

9. Estimate and interpret the needs of the prospective buyer . . .

10. Diagnose the opportunities for sales . . . . . .

C. CLOSE THE DEAL

11. Complete financial transactions . . . . . .

12. Provide for continued service, education, and good-will . . .

D. FOLLOW-UP AND EVALUATION

13. Check on results obtained by customers . . . . . .

14. Provide complete and acceptable records of sales program . . .

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Purchasing

1. SET GOALS - Plan a course of action for purchasing . . . . . .

2. DETERMINE NEEDS - Identify requirements and spell out specifications of acceptability . . . . . .

3. CHOOSE - Consider the alternatives and select according to specifications, reject sub-standard goods and services . . . . . .

4. PURCHASE - Procure goods or services . . . . . .

5. DETERMINE - Estimate price based on market reports, grades, transportation differential, supplies, etc.; determine prices to offer . . . . . .

6. DELIVERY - Arrange for delivery and mode of transportation . . . .

Inspection, Enforcement, Regulation, and Control

1. Inspection - examination of agricultural products . . . . . .

2. Standardization of agricultural products . . . . . .

3. Control of agricultural products . . . . . .

4. Certification of agricultural products . . . . . .

5. Quarantine of agricultural products . . . . . .

6. Grading of agricultural products . . . . . .

7. Analysis of agricultural programs . . . . . .

8. Regulation of agricultural programs . . . . . .

9. Enforcement of agricultural programs . . . . . .

10. Research on agricultural programs . . . . . .

11. Development of agricultural programs . . . . . .

12. Administration of agricultural programs . . . . . .

13. PROMOTION AND PROTECTION - Engage in activities which enhance and safeguard California's agriculture . . . . . .

14. SERVICE - Provide California agriculturists with specialized services . . . . . .

15. PROTECT THE CONSUMER - Guard against deception and fraud by those who sell agricultural products and services . . . . . .

Education - Extension Work

A. EDUCATION - Provide schooling, instruction, guidance, and training

1. General Education and citizenship training . . . . . .

2. Vocational education . . . . . .

3. Technical education . . . . . .

4. Professional education . . . . . .

5. In-service education (upgrading) . . . . . .

6. Retraining . . . . . .

7. Avocational . . . . . .

8. Training for disadvantaged, culturally deprived . . . . . .

B. EXTENSION WORK

9. TRANSMIT - research results to producers, handlers, consumers of farm products . . . . . .

10. CONDUCT - educational programs to increase the knowledge, and improve the skills of California citizens .

11. DEMONSTRATE - and conduct adaptive research . . . . . .

Clerical - Office

1. Prepare correspondence and communications . . . . . .

2. Prepare office reports, records, inventories . . . . . .

3. Prepare financial accounts, books, budgets, and operating statements . . . . . .

4. Keep materials and production records . . . . . .

5. Keep employee records . . . . . .

6. Duplicate and reproduce written or printed materials . . . . . .

7. Operate office machines and communications devices . . . . . .

8. Act as receptionist and schedule appointments . . . . . .

9. Purchase and/or requisition office supplies . . . . . .

10. Engage in office sales . . . . . .

11. Handle money and make depostis . . . . . .

Public Relations

A. DEVELOP PUBLIC RELATIONS PROGRAMS

1. Determine what results are desired from involvement in public relation activities . . . . . .

2. Formulate goals and objectives . . . . . .

3. Decide upon ways and means . . . . . .

4. Inventory and allocate resources for effective public relations program . . . . . .

B. CONDUCT PUBLIC RELATIONS PROGRAM (Promote, Publicize).

5. Prepare and release information for dissemination by means of public communications media . . . . . .

6. Prepare and release reports of activities and events including purpose, procedure used, and evaluation of results . . . . . .

7. Make public appearances--present talks, lectures, demonstrations . . . . . .

8. Visit agriculturists in field of related endeavor and learn of the relationships which exist . . . . . .

9. Meet and cooperate with others in developing solutions in agricultural problems . . . . . .

10. Initiates, plans, sponsors, and/or conducts meetings, seminars, conferences, or discussions on appropriate topics . .

11. Assist in the promotion, preparation, distribution, and use of informational materials . . . . . .

12. Recommend names of persons available as resource persons in agriculture . . . . . .

13. Other . . . . . .

C. ENGAGE IN INFORMAL PUBLIC RELATIONS ACTIVITIES

14. Meet potential business associates socially . . . . . .

15. Provide non-business services to business associates . . . . .

D. EVALUATE

16. Determine effectiveness of efforts . . . . . .

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Growing of Plants

Soil Preparation to Harvest

1. Soil tillage and land preparation . . . . . .

2. Prpoagation, planting, transplanting of plants . . . . . .

3. Irrigation and drainage . . . . . .

4. Weed, pest and disease prevention, control, and eradication . . . .

5. Pruning, thinning, and training . . . . . .

6. Soil fertilization and plant nutrition . . . . . .

7. Plant breeding, selection, reproduction . . . . . .

8. Harvesting . . . . . .

9. Weather modification for plant production . . . . . .

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Livestock and Poultry Production

1. Deciding on amounts and kinds of feed . . . . . .
2. Feeding livestock . . . . . .
3. Deciding on action to take for insect disease, and parasite prevention, control, and eradication . . . . . .
4. Taking action to prevent, control, and eradicate insects, disease, and parasites . . . . . .
5. Animal alteration . . . . . .
6. Selection of breeding stock . . . . . .
7. Providing breeding services . . . . . .
8. Deciding what matings to make and when to breed . . . . . .
9. Solving problems of physiology and reproduction . . . . . .
10. General care of livestock for meat production . . . . . .
11. General care of livestock for milk production . . . . . .
12. General care of livestock for wool production . . . . . .
13. General care of birds for egg production . . . . . .
14. Training of livestock for special performance . . . . . .
15. Cleaning of livestock facilities . . . . . .
16. Building and/or maintaining livestock facilities . . . . . .
17. Grooming and clipping livestock facilities . . . . . .
18. Providing specialized care for young livestock . . . . . .
19. Milking cows . . . . . .
20. Specialized care of horses . . . . . .

Construction, Maintenance, Repair, and Operation of Agricultural Machinery, Equipment, and Facilities

1. Maintaining and minor repairing of electrical motors . . . . . .
2. Maintaining and minor repairing of small gas engines . . . . . .
3. Maintaining large gas engines . . . . . .
4. Maintaining diesel engines . . . . . .
5. Performing major overhaul of diesel engines . . . . . .
6. Performing major overhaul of gas engines . . . . . .
7. Adjusting and calibrating field equipment for proper operation . .
8. Operating small gas engine equipment . . . . . .
9. Operating large gas engine equipment . . . . . .
10. Operating diesel engine equipment . . . . . .
11. Designing equipment . . . . . .
12. Designing structures . . . . . .
13. Constructing structures and facilities . . . . . .
14. Constructing equipment . . . . . .
15. Setting up equipment for use (install, establish, and service) .
16. Determine suitability of equipment for particular jobs . . . . . .
17. Establishing and maintaining a record system for maintenance, service, operation, and repair . . . . . .

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Handling Agricultural Materials
(Transference, Packaging, and Storage)

A. Transference of agricultural materials

1. Conveying (continuous or intermittent forward movement--continuous drive) . . . . . .

2. Lifting and hoisting (reversing vertical or lateral movement) .

3. Positioning, weighing, and controlling . . . . . .

4. Transporting (carrier handling) . . . . . .

B. Packaging

5. Industrial packing . . . . . .

6. Packing of semifinished and finished products (incl. sorting of fruits and vegetables) . . . . . .

C. Storage and warehousing

7. Receiving . . . . . .

8. Storing . . . . . .

9. Shipping . . . . . .

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Processing and Packing Agricultural Products

1. Planning--setting goals and objectives, determining ways and means of processing program . . . . . .

2. Interpret USDA, state, local, and firm requirements, regulations, specifications, standards, controls, tests . . . . . .

Performing such processing operations as:

3. Mixing, compounding, blending, kneading, shaping, and related work . . . . . .

4. Separating, crushing milling, chopping, grinding, and related work . . . . . .

5. Culturing, melting, fermenting, distilling, saturating, pickling, aging, and related work . . . . . .

6. Heating, rendering, melting, drying, cooling, frezing, and related work . . . . . .

7. Slaughtering, breaking, curing, and related work . . . . . .

8. Processing of food, tobacco, and related products not classified above . . . . . .

9. Operating and adjusting all processing equipment and machinery . .

10. Maintaining and servicing--keeping equipment in operational condition . . . . . .

11. Trouble shooting problems as they arise . . . . . .

12. Keep records, accounts, and reports of pertinent aspects of processing operation . . . . . .

13. Analysis and evaluation--Reviews results of program and recommends improvements . . . . . .

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Marketing Agricultural Products

1. Advertising agricultural products . . . . . .

2. Retail sales of agricultural products . . . . . .

3. Wholesale sales of agricultural products . . . . . .

4. Forecasting prices of agricultural products . . . . . .

5. Selection of market outlets for agricultural products . . . . . .

6. Cooperative marketing--contract farming . . . . . .

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Development of Air, Land, and Water Resources

A. Development of water resources

1. Planning irrigation systems . . . . . .
2. Installing irrigation systems . . . . . .
3. Servicing irrigation systems . . . . . .
4. Constructing dams and/or ponds . . . . . .
5. Planning drainage systems . . . . . .
6. Constructing drainage systems . . . . . .
7. Testing water quality . . . . . .
8. Assessing water needs . . . . . .
9. Measuring water use . . . . . .

B. Development of land resources

10. Surveying . . . . . .
11. Land leveling . . . . . .
12. Adjusting pH of soil . . . . . .
13. Leaching of soil . . . . . .
14. Assessing suitability of soil for various purposes . . . . . .
15. Taking soil samples . . . . . .
16. Testing soil . . . . . .

C. Development of air resources

17. Testing extent of pollution . . . . . .
18. Testing effects of pollution . . . . . .
19. Controlling pollution . . . . . .

Environmental Horticulture

(Landscapes, gardens, flowers, ornamentals)

1. Growing of plants for ornamental horticultural use (See plant Science) . . . . . .

   (Ground cover, shrubs, flowers, trees, vines, succulents, cactii, turf, potted plants, bedding plants, bulbs)

2. Greenhouse operation and management . . . . . .

3. Landscape architecture . . . . . .

4. Landscape contracting . . . . . .

5. Landscape design . . . . . .

6. Landscape gardening (Locating, planting, maintenance) . . . . . .

7. Nursery operation and management . . . . . .

8. Turf management . . . . . .

9. Care of plants in containers outdoors . . . . . .

10. Care of plants in containers indoors . . . . . .

11. Care of cut plant material (including flowers) . . . . . .

12. Arrangement of cut plant materials . . . . . .

Forestry, Range, and Wildlife

1. Survey of forest, range, and wildlife resources . . . . . .

2. Propagation of forest trees and range plants and reproduction of wildlife . . . . . .

3. Preservation, conservation, re-vegetation, stocking, and improvement practices . . . . . .

4. Development of recreational resources . . . . . .

5. Utilization and management of forest, range, and wildlife resources

6. Protection of forest, range, and wildlife resources . . . . . .

Recreation, Parks, and Scenic Beauty

A. Planning and Designing of:

1. Arboretums, botanical gardens, and natural areas of scenic beauty . . . . . .

2. Golf courses and other outdoor sports areas . . . . . .

3. Parks, picnic grounds, camp sites, and playgrounds . . . . . .

4. Fishing areas . . . . . .

5. Hunting areas . . . . . .

B. Developing and Establishing of:

6. Arboretums, botanical gardens and natural areas of scenic beauty . . . . . .

7. Golf courses and other outdoor sports areas . . . . . .

8. Parks, picnic grounds, camp sites, and playgrounds . . . . . .

9. Fishing areas . . . . . .

10. Hunting areas . . . . . .

C. Maintenance and Upkeep of:

11. Arboretums, botanical gardens and natural areas of scenic beauty . . . . . .

12. Golf courses and other outdoor sports areas . . . . . .

13. Parks, picnic grounds, camp sites, and playgrounds . . . . . .

14. Fishing areas . . . . . .

15. Hunting areas . . . . . .

D. Operation and Management of:

16. Arboretums, botanical gardens and natural areas of scenic beauty . . . . . .

17. Golf courses and other outdoor sports areas . . . . . .

18. Parks, picnic grounds, camp sites, and playgrounds . . . . . .

19. Fishing areas . . . . . .

20. Hunting areas . . . . . .

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Form III: Firm Questionnaire -

(Statewide Sample)

JOBS IN CALIFORNIA AGRICULTURE

1. Name of firm _____
2. Address _____
3. County _____
4. Name of person completing form _____
5. Position of person completing form _____
6. Telephone _____
7. SIC No. _____
8. Major functions of the firm, including a listing of products, goods, and/or services. (In the case of a farming operation, include the number of acres devoted to each crop, number of livestock, etc.)

_____

_____

_____

_____

_____

_____

9. Number of years the firm has been in business in California? (Check one.)

_____(0)	1 or less	_____(5)	11 - 15
_____(1)	2 - 3	_____(6)	16 - 20
_____(2)	4 - 5	_____(7)	21 - 30
_____(3)	6 - 7	_____(8)	Over 30
_____(4)	8 - 10		

10. Total number of persons in firm in California. (Include owners if they are actively engaged in the operation of the business, but exclude stockholders or other absentee owners.)

10a. Year round _____

10b. Seasonal _____

11. Total number of above persons who need agricultural competencies. (See explanation sheet for a definition of agricultural competencies.

11a. Year round _____

11b. Seasonal _____

IF BOTH 11a AND 11b ARE ZERO, STOP HERE. ALL FURTHER QUESTIONS ARE ASKED ONLY ABOUT THOSE EMPLOYEES WHO NEED AGRICULTURAL SKILLS OR KNOWLEDGE IN PLANT, ANIMAL, OR SOIL SCIENCE. AGRICULTURAL MECHANIZATION, OR AGRICULTURAL BUSINESS MANAGEMENT OR MARKETING.

12. Job Titles which require agricultural competencies.

	1 Job Title	2 No. of Persons in This Job Title In 1969	3 No. of Persons in This Job Title Expected 1970	4 Educational Level You Require Completed before Job Entry	5 Average Salary $/Month (Optional)
YEAR ROUND					
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
TOTAL (Must = 11a)					

SEASONAL					$/Hour
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
TOTAL (Must = 11b)					

13. Please list those job titles in which you anticipate an increase or decrease in the number of people by 1975. Include any job titles that will be new to your business or those which will be completely eliminated by 1975.

Job Title	Increase or Decrease	Expected Number of Change	Reason for Change

14. Are there any year-round jobs for which you are trying to hire a qualified person right now? If so, please list below.

Job Title	Beginning Salary

15. Are there any job titles (year-round or seasonal) which have been troublesome to fill (or keep filled) in the last few years? If so, please list them and give the reason they have been problems.

Job Title	Reason for Problem

COMMENTS: _____

Postcard Questionnaire

(Statewide Sample)

1. Number of employees: Year Round___ Seasonal___
2. Do you expect the number of Year Round Jobs to: (Underline: Increase Decrease Remain Same) in next 5 years?
3. If increase or decrease, Why?_____
4. If increase or decrease, list the job titles that will change:

Job Title	Number Now	Number 5 Yrs. from now

5. Describe business (major crops, products, and/or services):

_____

The Postcard Questionnaire was used to supplement the data obtained through Form III - Mailed Questionnaire.

APPENDIX B

THE CLASSIFICATION AND DESCRIPTION OF BUSINESSES INVOLVED IN AGRICULTURE

Given the broad definition of agriculture envisioned by the planners of this project, an early priority was a method of identifying and classifying all of the various businesses involved in agriculture. Dr. Jerry Halterman, the original Research Coordinator of the project, developed a schema for this purpose, which he titled "The Agricultural Complex." This complex is broken down into four sectors.

Sector A is entitled "Air, Land, and Water," and is described as "the utilization and management of air, land, and water for agricultural purposes, and the effects of these endeavors." Under this heading are listed such endeavors as agricultural business management, agricultural mechanics and engineering, air science, animal science, forestry, land science, landscape horticulture, plant science, rural recreation, and wildlife management.

Sector B is "Agricultural Products" and includes " providing of consumers with the products of agriculture in the form, time, place, and utility desired." This is broken down into Food Products, such as meat, fish, poultry eggs, dairy products, fruit and vegetables, and cereal grains and their products; and Nonfood Products, such as cotton, tobacco, wool, fertilizer, feed, and forest products.

Sector C, "Goods and Services," is the "providing of goods and services which are utilized in any phase of the agricultural complex." Goods listed include such supplies as chemicals, seeds, and feeds; equipment and machinery; structures; and finance. The services are extensive, including the business services of credit, insurance, accounting, consultation, storag warehousing, transport, business management and marketing; the public services of inspection, regulation, utilities, labor supply; and the special services of chemical application, pest control, animal breeding, propagation, agricultural mechanics and engineering, and food technology.

Sector D is the "Supporting Groups," which "provide other support to the agricultural complex as appropriate and necessary." Included here are public and private agencies involved in agricultural education, agricultural research, program administration, and organization such as boards, associations, councils, foundations, and various grower and producer groups.

This classification was submitted to various individuals and groups for their consideration and recommendations. Little objection was raised, the consensus being that it was comprehensive and valid. The description of the complex does not, however, provide a means of identifying businesses for the purpose of drawing a sample and conducting interviews or mailing a questionnarie. Used for this purpose were

listings from the Disability and Unemployment Insurance records of the California State Department of Employment. These records are categorized according to the Standard Industrial Classification (SIC), and it was possible to obtain from them the firm (or owner) name and address, the county in which the people were employed, and the number of people employed during the quarter chosen. All SIC categories were selected in which there was any chance that agriculturally trained people might be employed in significant numbers. The SIC categories selected are as follows:

1957 SIC Codes and Short Titles
(* California Only)

0112	Cotton
0113	Cash Grains
0119	Field Crops, nec*
*0121	Citrus Fruits
0122	Fruits and Tree Nuts
0123	Vegetables
0132	Dairies
0133	Poultry Farms
0139	Livestock Farms, nec
0142	General Farms--Primarily Crop
0143	General Farms--Primarily Livestock
0144	General Crop and Livestock Farms
0192	Horticultural Specialties
0193	Animal Specialties
0199	Agricultural Production, nec
*0399	Agricultural Activity Unknown
0712	Cotton Ginning and Compressing
0713	Grist Mills
0714	Corn Shelling, Hay Baling, Threshing
0715	Packing of Fruits and Vegetables, Contract
*0716	Contract Sorting, Grading, & Packing of Citrus Fruit For Others
*0718	Farm Labor Contractors
0719	Agricultural Services, nec
0722	Veterinarian & Animal Hospitals
0723	Poultry Hatcheries
0729	Animal Husbandry Services, nec
0731	Horticultural Services
0741	Hunting, Trapping, Game Propagation
*0751	Farm Labor Association, Other Than Citrus
*0752	Farm Labor Association, Citrus
*0753	Farm Commodity Association, Other Than Citrus
*0754	Farm Commodity Association, Citrus
*0761	Harvesting & Resale of Purchased Crops
0811	Timber Tracts
0822	Forest Nurseries
0842	Gathering Barks & Gums, Except Pine
0851	Forestry Services
0861	Gathering of Forest Products, nec
0989	Fish Hatcheries, Farms & Preserves

*Not elsewhere classified.

2011	Meat Packing Plants
2013	Sausages & Other Prepared Meats
2015	Poultry Dressing Plants
2021	Creamery Butter
2022	Natural Cheese
2023	Condensed & Evaporated Milk
2024	Ice Cream & Frozen Desserts
2025	Special Dairy Products
2026	Fluid Milk
2033	Canned Fruits and Vegetables
2034	Dehydrated Food Products
2035	Pickles, Juices, & Salad Dressings
2037	Frozen Fruits and Vegetables
2042	Prepared Feeds for Animals & Fowls
2044	Rice Milling
2046	WetCorn Milling
2063	Beet Sugar
2082	Malt Liquors
2083	Malt
2084	Wines, Brandy, & Brandy Spirits
2085	Distilled Liquor, Except Brandy
2091	Cotton Seed Oil Mills
2092	Soybean Oil Mills
2093	Vegetable Oil Mills, nec
2094	Grease and Tallow
2095	Animal & Marine Fats & Oils, Except Grease & Tallow
2096	Shortening & Cooking Oils, nec
2099	Food Preparations, nec
2871	Fertilizers
2872	Fertilizers, Mixing Only
2873	Agricultural Pesticiedes
2879	Agricultural Chemicals, nec
3422	Farm Machinery
4221	Farm Product Warehousing & Storage
4222	Refrigerated Warehousing, nec
4223	Food Lockers
4731	Stockyards
4911	Electric Companies & Systems
4931	Electric & Other Services Combined
4971	Irrigation Systems
* 5040	Wholesale Growers, Packers, & Shippers of Fruits and Vegetables
5041	Groceries, General Line
5043	Dairy Products
5044	Poultry and Poultry Products
5047	Meats and Meat Products

5048 Fresh Fruits and Vegetables
5051 Farm Products--Raw Materials
5083 Farm Machinery & Equipment
5089 Machnery & Equipment, nec
5099 Wholesalers, nec

5251 Hardware Stores
5252 Farm Equipment Dealers
5962 Hay, Grain, & Feed Stores
5969 Farm & Garden Supply Stores, nec
5992 Florists

6022 State Banks, Federal Reserve
6025 National Banks, Federal Reserve
6131 Agricultural Credit Institutions
6515 Lessors of Agricultural, Forest, & Similar Properties

7342 Disinfecting and Exterminating
7361 Private Employment Agencies
7391 Research, Development, & Testing Laboratories
7699 Repair Services, nec
7941 Sports Promoters, Athletic Fields
7942 Public Golf Courses
7946 Riding Academies
7947 Golf Clubs and Country Clubs
7949 Amusement & Recreation, nec

8421 Botanical & Zoological Gardens
8611 Business Associations
8621 Professional Organizations
8699 Nonprofit Member Organizations
8921 Nonprofit Research Agencies

Some of these categories were grouped together as indicated in the discussion which follows. The descriptions are derived from the official SIC manual, supplemented by data obtained from the project interviewing in the ten California counties. It should be noted that the placement of a business in a particular SIC category is often a hazardous undertaking, for overlapping is frequent. In almost all cases, we accepted the classification already made by the Department of Employment, although the classification was changed when the interview data revealed an obvious error.

Field Crops, 0112, 0113, 0119

These categories are composed of establishments engaged primarily in the production of cotton (0112), cash grains such as barley, corn, oats, rice, and wheat (0113), and other field crops such as alfalfa hay, potatoes, and sugar beets (0119).

The Department of Employment listing contained 2,343 firms in these three categories. Of these firms, 66% had five employees or fewer, while only 3% employed over 50 people. However, these larger operations hire 42% of the people represented by this particular listing of businesses. Geographic distribution is quite extensive, although the farms in 0112 are concentrated primarily in 5 counties in the lower San Joaquin County. Firms in the other two categories are much more widespread, but still heavily concentrated in the central valleys.

Interview data were tabulated from 53 firms in these three categories. Acreage ranged from a low of 80 acres to a high of 40,000, involving from one person (in three instances) to 539 (in the largest operation). Almost all had at least one resident owner/operator, with several partnerships represented. The smallest operations have few year-around employees in addition to the owner/operator, with the additional help ususally classified as "Farm Hands," although a limited number are involved with livestock as well as crops and are therefore classified as "Farm Hand, General." Medium-sized operations usually have the addition of a supervisory person, often identified as a "General Foreman," and an equipment operator, most commonly a "General Tractor Operator." Also, the number of farm hands will increase and more specialized production workers begin to be listed, usually as "Irrigators." The larger businesses in this category increase the number of people in all classifications previously mentioned, add additional levels of supervisory and managerial personnel, and list different types of equipment operators in addition to tractor drivers. Approximately 20% of the firms list more than 5 different job titles, with the largest operation having 11. As indicated above, these larger units, although a small percentage of the total, employ a large percentage of the people. In this case, 70% of the year-around employees work on the farms which have more than 5 job titles.

The situation in seasonal jobs is not so clearcut. In the first place, people in such jobs as field hands and harvest hands are often employed by contractors, and therefore, do not appear as employees

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of the individual firm. In addition, the knowledge and skill level is such that some employers failed to list these employees because they did not consider them to need "agricultural skills and competencies." Even when figures are listed for such people, the figures are usually quite approximate in that the actual number varies throughout the season. Seasonal jobs are definitely involved in this SIC category, not only in the titles of field and harvest hand, already listed, but also in such titles as "Irrigator," "Tractor Driver, General," "Equipment Operator, General," and several types of specialty-equipment operators. Jobs of these latter types appear frequently in the smaller operation, where similar year-around titles do not exist, are seldom listed by the middle-sized operator, and then appear again in the larger operation in supplement to year-around workers who do the same general type of work.

0121, Citrus Fruit Farms

This classification is composed of establishments engaged primarily in the production of citrus fruit. It is a special classification for California and not included in the Standard Industrial Classification Manual, which included citrus in 0122. Many of these establishments also include a packing and shipping operation, but on-farm production must be extensively involved for the establishment to be classified here.

The Department of Employment listing contained only 1,875 firms, of which 80% of which had 5 employees or less, and only 2% had over 50. The two counties of Ventura and Tulare account for 46% of the firms listed in this category, although several nearby counties are also heavily represented. Very few citrus groves are located in any other areas.

Interviews were conducted on 23 citrus operations, with acreage ranging from 100 to a high of 1,265. The latter operation also listed 2,700 acres of range land. The modal number of year-around job titles was 3 (1 to 18). The patterns of job titles are similar to those described for the field crop farms. The smaller operations usually have a minimum number of "Farm Hands, Crop," in addition to the owner/operator, with an increase in the number in this job title and the addition of supervisory personnel as the business increases in size. One apparent difference is that personnel designated as equipment operators do not appear until the size reaches the largest category. Supervisory personnel not only are numerous but appear on several levels on the larger farms, and are divided between the farming and packing operations of the firm. Like the tractor drivers, specialized production personnel such as irrigators do not appear until the operation becomes quite large.

Seasonal personnel are primarily pickers, with some graders also listed. Workers in the packing part of the operation, titled "Packers, Fruit," are sometimes listed as seasonal, but are also listed as year-around. Some Crew Foremen and some Division Foremen are also listed

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as seasonal, with the majority year-around. Again, some picking crews are provided by a labor contractor or by an outside packing house and do not appear as employees.

0122, Fruits & Tree Nut Farms

Establishments in this category are engaged primarily in the production of fruits and tree nuts, excluding citrus fruit, which is classified separately (as 0121) in California. The classification includes grapes, bush berries, and strawberries, as well as all the deciduous tree fruits.

This is the largest single SIC category in which agriculture is involved in California, with 10,154 firms named in the Department of Employment listing. Of these, almost half (48%) indicated 5 or fewer employees, while only 4% listed more than 50. However, the over-50 group accounted for 35% of the total employees, compared with less than 10% for the 5- or-fewer category. Geographic distribution is, of course, extensive, since practically every county in the state has at least some acreage devoted to production of one of the crops included. Most of the farms are in the central valleys, however, as are the farms with the large acreages.

Data were tabulated from interviews on 198 of these farms. Acreage ranged from a 10-acre strawberry patch to an 1,850-acre diversified fruit, nut, and row-crop operation. Some have a packing house in conjunction with the production enterprise, although operations in which packing or processing dominates are in another category, of course.

The number of year-around job titles varied from one (the owner/operator) to twenty (in two cases), with one, two, or three the number listed in three fourths of the cases. Again, however, it must be pointed out that the larger operations involve most of the people; in this case two thirds of the year-around people listed are on the 25% of the farms that list four job titles or more.

The owner/operator (sometimes a partner) is the only year-around job title involved in the smaller operations. The first job title added is either a General Foreman (often designated as a "working foreman") or a Farm Hand, Crop. In reality, these two job titles are used to cover similar functions and activities. Like the owner/operators on small farms, the man designated by these titles do all types of work, from tractor driving to hand labor, and supervise seasonal labor when such laborers are employed. When a third job title is involved, both the foreman and farm-hand classifications are usually listed, with the foreman being more of a supervisor than a worker, and the farm-hand category is used to designate several employees rather than just one. In some instances, more specialized production titles, such as Irrigators and Tractor Driver, General, begin to appear as the third title, but the functions and activities involved in these instances are quite general too. As the size of operation increases beyond this point, the most obvious increase in job titles involved increases in the number of different levels and types of supervisory and managerial

personnel. The designation of Crew Foreman appears most frequently, along with Divison Foreman and Division Managers. The number of people involved in the title of Farm Hand on each farm increases in these larger operations. The frequency with which the specialized titles of Tractor Operator and Irrigator are listed increases along with the number of people in each category. Other titles also appear frequently, such as Equipment Operator, Mechanic, and Truck Driver, along with an occasional entry such as Repairman, Heavy Equipment Operator, Fork-Lift Operator, and Pruner.

On these fruit and nut farms the seasonal job titles are, of course, most frequently Harvest Hand, Pruner, and Thinner, although these are often included together under the title of Field Hand, Fruit and Nuts. In these cases, the only difference between the small and large operations is in the number of people listed in these titles. Since many of the larger farms include a packing operation, such titles as Sorter, Packer, and Shed Hand appear frequently. Crew Foremen and Tractor Operators are also listed as seasonal jobs in many operations of all sizes.

0123, Vegetables

Establishments in this classification are engaged primarily in the production of vegetables. Like the businesses in 0121 and 0122, a packing or processing operation is often part of the total business, but production must be primary.

This is not a large category, since only 1,430 firms are listed by the Department of Employment. The number of employees per firm is slightly higher than for production agriculture in general. This is indicated by the fact that only 2% of the personnel are in the firms employing 5 people or less (even though this category represents 34% of the total firms), while 68% are employed by firms in the over-50-employee category (17% of the total firms).

Since a wide variety of vegetable crops are included in this category, total geographic distribution is extensive. Monterey County, however, has slightly more than twice as many of these firms as any other single county, as well as being the headquarters for many of the largest operations.

Tabulation was done on interviews obtained on 54 farms in this category. Acreage ranged from 20 acres to 16,000 in one instance, to 25,000 in another. The number of year-around job titles varied from 16 to 1, with an indication that there were more job titles in a higher percentage of cases than indicated in other areas of production agriculture. The two job titles listed most commonly are Farm Hand, General, and Foreman, General, once the size of operation gets past that which can be handled by the Owner/Operator himself, with equipment operators (usually Tractor Driver, General) and Irrigator, along with Crew Foreman, appearing frequently in the medium-sized operations. As size increases, the titles Division Foreman and Crew Foreman become much more frequent than Foreman, General, with several people involved

in each title. Various kinds of Division Managers are also listed. The big operations have tractor drivers, mechanics, and irrigators more frequently than general farm hands. Various kinds of field hands and vegetable packers are listed frequently as year-around employees.

Seasonal job titles such a Field Hand, Weeder, Harvest Hand, and Vegetable Packer are present extensively, with fairly large numbers of people involved in each. Seasonal supervisory personnel and production personnel, such as irrigators and tractor drivers, are not listed as frequently in these operations as in others, indicating a higher incidence of year-around employment in these titles in this SIC than in others.

0132, Dairies

Establishments in this classification are engaged primarily in producing cow's milk and other dairy products. Processing may also be done, although processing and/or distribution of milk from a separate establishment not on the farm is classified in manufacturing or trade.

The Department of Employment listing contained 2,207 of these establishments, with 79% having 5 or fewer employees. These smaller businesses employed an indicated 37% of the employees, which is approximately 25% higher than in agricultural production units in general. Similarly, farms on which more than 50 people were employed represented less than 1% of the total businesses and employed only 16% of the people.

Dairies are spread throughout the state, with two major concentrations. Los Angeles and San Bernardino Counties are the center of the Southern California concentration, with Los Angeles the leading county in the state in dollar volume of business from dairies, while Stanislaus, San Joaquin, and Merced Counties form the nucleus of the concentration in the central valleys.

Interviews were conducted on dairies in all of the 10 interview counties, and the tabulations are based on 54 businesses. Processing was carried on by very few of the firms interviewed, and very little farming other than that related to milk production was encountered. This is especially true of dairies in Los Angeles County, which produced very little of the feed used. The size ranged from 73 acres and 54 head of dairy animals to a high in terms of livestock of 4,000 head, with 500 acres involved. In terms of acres, the high in this category was 2,000, with 1500 head.

The common titles in the smaller dairies are owner/operators and milkers, titled Milking Machine Operators. The next title added is usually Farm Hand, Livestock, with a Foreman, General, listed occasionally. This latter title is usually the next added, along with Feeder, Livestock. The addition of Herdsman and divisional supervisory and managerial titles completes the major list of year-around job titles involved, although the numbers involved in the titles of milker, feeder, and farm hand increase as size increase. Mechanics are listed fairly

frequently by the larger operations, whereas specialized tractor drivers and other equipment operators are listed only occasionally.

Seasonal job titles are not prevalent enough for any patterns to be distinguishable. Found sporadically are such titles as Field Hand, General; Irrigator; Farm Hand, Livestock; Tractor Operator, General; and some specialized equipment operators, most usually Hay Equipment Operators. Dairy farming is not, however, a heavy user of seasonal personnel.

0133, Poultry Farms

This classficiation includes all farms producing poultry and poultry products--either eggs or meat. Also included are farms devoted to the production of ducks, pheasants, and other game birds. The most recent classification separates broiler chickens into a separate category, but the records used for this study were still classified under the old system. Poultry Hatcheries are classified in 0723, while the processing of poultry meat is in 2015, and the wholesale distribution of eggs and other poultry products is in 5044.

The Department of Employment listing contained 933 of these farms, and 68% of these were in the low-employment group of 5 employees or fewer. These farms employed only 16% of the employees, while the 3% which had more than 50 employees employed 37%.

San Bernardino and Riverside Counties, in the south, and Stanislaus and Sonoma Counties, in the north, have the largest number of farms listed in this category. Many other counties have a few poultry farms.

Interview results are compiled from 24 farms. The largest operation recorded has 300,000 hens. On a few farms, Owner/Operator was the only job title listed, although in these particular instances more than one owner was indicated—in other words, a family operation. Farm Hand, Poultry, was the first job title added, with Foreman, General, the next. The largest operations had more than one type of supervisory personnel, and several people listed as farm hands. Poultry Feeders and Mechanics or Repairmen were listed frequently by these larger farms, along with an occasional Salesman and Truck Driver. One operation listed a Nutritionist and a Veterinarian, while another had an Artificial Inseminator.

Seasonal titles were not present in most cases, although a few farms had a few people listed as seasonal employees under the title Farm Hand, Poultry.

0139, Livestock Farms

Included inthis category are all types of livestock-production farms, including farms where livestock feeding is a major activity. Drylot feeding operations, with no farming or pasturing, are classified in 0729. In the new system of classification, livestock farms are divided into 0135, beef cattle; 0136, hogs; and 0139, livestock not

classified elsewhere. This study, however, is based upon the previous classification, which lumps them all together.

The Department of Employment listing gave 2,059 farms in this category. The group with 5 employees or fewer was in much higher percentage than usual (84%). Even with this number, only 46% of the employees were found in this category. Less than 1% of the farms indicated over 50 employees, representing 11% of the people employed. Although not verified by the interviewing, it is assumed that these few farms with large numbers of employees are involved in some other types of farming, since there is no indication that such large numbers of people are involved on a farm devoted strictly to livestock production. The largest operation in terms of employees on which interviewing was conducted reported 29 people involved year-around, with an additional 10 seasonally.

Geographic distribution is, of course, quite widespread, with the rangeland production of livestock in the extensive foothill and mountain areas of the state, and the irrigated-pasture production in the valleys. No single county or group of counties is outstanding.

Data are tabulated from interviews conducted on 24 livestock farms. These varied in size from 150 head of livestock to 25,000, and included some operations which had sheep and hogs in addition to cattle. In addition to the owner-operator, the most common job title is Farm Hand, Livestock, with 1 to 3 people listed on he smaller operations and 10 on the largest. As with the other types of production enterprises, foreman begins to be listed in the medium-sized operations and increases in number and type as the business gets larger. Other year-around titles are encountered only sporadically. The larger operations do have such specialized titles as Feedmill Worker and Feeder, Livestock.

Seasonal employment is not extensive in terms of numbers, though some seasonal titles are listed on almost every enterprise. Listed most frequently is Farm Hand, Livestock. Appearing occasionally are Field Hands, Hay Machinery Operators, Irrigators, and Livestock Feeders.

General Farms, 0142, 0143, and 0144

The 1956 SIC classification utilized three categories of general farms: General Farms, Primarily Crop (0142); General Farms, Primarily Livestock (0143); and General Crop and Livestock Farms (0144). The 1967 revision combines these three into one: General Farms, 0141. Even though the original listing was divided according to the 1957 classification, the data are combined into one group for our discussion.

A total of 6,414 farm businesses were listed by the Department of Employment in these 3 categories, with 0142 being the predominant group. Slighly over half of the farms had five employees or fewer, accounting for about 8% of the employees. Almost half of the employees were listed for the 6% of the firms which had 50 employees or more. Distribution geographically is extensive, although the central valleys have the most, as would be expected.

Data are presented from interviews conducted on 81 of these farms. The modal number of year-around job titles is 3, which is similar to the situation in other farming SIC's. However, over half of the interviewed firms had more job titles than 3, which is not so common, a reflection of the diversity of these general farms. The pattern of which job titles are added as the size of the operation increases is very similar to that already described for other farming operations. As an example of the pattern of a large operation, the following job titles are listed: 1 owner, 1 manager, 2 division managers, 5 general foremen, 16 assistant formen, 24 division foremen, 18 mechanics, 100 equipment operators, and 175 farm hands. In addition to these year-around titles are the seasonal jobs: 10 assistant foremen, 20 equipment operators, 1,395 general field hands, and 75 livestock hands. A limited number of professionals are also found on some of these large farms.

Horticultural Specialties, 0192

Establishments in this category are engaged in producing horticultural specialty crops, such as flowers, bulbs, ornamental plants, and sod. It includes both outdoor growing, such as field nurseries, and growing in hothouses, greenhouses, and similar structures. Los Angeles County has more than twice as many of these establishments as any other county, with Santa Clara, San Diego, and San Mateo being other leading counties. Total geographic distribution is spread throughout the state.

A total of 1,317 firms were identified on the listing from the Department of Employment, of which 6% had more than 50 employees, totaling almost half of the personnel. Slightly over half of the firms employed 5 or less, only 8% of the total employees. Data from interviews in 33 of these businesses are included in the discussion.

Job patterns are very similar to those found on the more traditional type of farm, except that the title Nursery Worker is often used instead of Farm Hand, and few equipment operators or mechanics are listed. In addition, the titles of Propagator and Budder appear frequently, especially in the larger firms. Field or Route Salesmen are also listed frequently in this SIC, whereas they never appear in the farming SIC's. Seasonal jobs were listed by about half of the employers, but most indicated that only one or two job titles are involved. Most are field hands or nursery workers, with a few budders or tractor drivers. Seasonal supervisory personnel do not seem to be as prevalent as they are in farming operations.

Animal Specialties, 0193

Animal specialites are establishments engaged in producing animals other than those normally associated with farming, such as dogs, fur-bearing game, and rabbits, although horses are included. Included are apiaries and aviaries. Businesses devoted exclusively to raising any of these or getting 50% or more of their income from such production are not numerous, with only 282 appearing on the official listing. Therefore, few jobs are actually involved, especially since 80% have 5

employees or fewer. No area is predominant, with the locations spread throughout the state.

Seven employers were interviewed, a number which does not provide much information about employment patterns, especially since three different types of production are involved. Four of these were horse farms, and one each an apiary, aviary, and small-animal farm. Employee numbers were not large in any of these.

Miscellaneous Production, 0199, 0399

All systems of classification must have a miscellaneous category, and the SIC system is no exception. California, in fact, has two such categories in the general classification of agricultural production. One is Agricultural Production Not Classified Elsewhere (0199), and the other special to California, Agricultural Activity Unknown (0399). Nine firms were listed in 0199, and 118 in 0399. Interviewing was conducted on farms so classified, but none are recorded as such. After the information about the firm was obtained, it was possible to reclassify it into one of the other SIC's.

Processing Services, 0712 through 0716

Several types of service businesses were combined into one group for the purposes of the study. These were Cotton Ginning and Compressing (0712); Grist Mills (0713); Corn Shelling, Hay Baling, and Threshing (0714); Contract Packing of Fruits and Vegetables (0715); and Contract Sorting, Grading, and Packing of Citrus (0716). The last is a special category for California, such operations being included in 0715 nationally. Even after these five are combined, the category remains relatively small, containing 435 firms. On the other hand, a rather high 14% employ more than 50 people, so that over 10,000 employees are involved, though most of these are only seasonal jobs. By their nature as agricultural service businesses, they are concentrated in the central valleys near the production they serve.

Twenty-six businesses are included in the data from the interviews. Year-around jobs are limited primarily to supervisory personnel, with the majority of other jobs being seasonal. Seasonal supervisory jobs, especially crew foremen, are also prevalent.

Farm Labor Contracting, 0718

Another category which is separated out for California is Farm Labor Contracting, included in 0719 in the SIC manual. Labor contracting is a large business in California, for many owner/operators of fruit and vegetable farms do not hire the crews which do field work, such as weeding, thinning, and pruning, or the harvest work. Although declining as seasonal hand-labor jobs decrease in number, 734 farm labor contractors were listed, involving almost 200,000 individuals. Because of the nature of the business, almost all of these are employed by contractors who have over 50 employees. Most are centralized in the San Joaquin and Sacramento Valleys, although Monterey is an important exception.

Data from interviews with 21 contractors are included. Almost half listed only one year-around job title, the contractor himself, with crew leaders often included in the seasonal category along with the field hands, harvest hands, packers, and pruners. The larger operators, however, did list more than one year-around title: most frequently crew foremen and other supervisors, although general farm hands, truck drivers, and tractor drivers are not uncommon. In most cases, of course, these contractors have to move with the cropping seasons to continue operations year-around.

Agricultural Services Not Elsewhere Classified, 0719

This is another miscellaneous-type category, including such service businesses as crop dusting, grain cleaning, crop spraying, rice drying, and farm management, providing they are done on a contract basis. This is a category of increasing importance in California agriculture, especially with regard to the use of expensive, specialized equipment which many growers do not find economic to own themselves. In addition, it appears that growers are beginning to hire specialized knowledge as well, such as an entomological service, which not only applies the chemical but first analyzes the problem, selling knowledge and service rather than chemicals. The Department of Employment listing contains 1,413 firms, with approximately 13,700 employees. Almost 60% of these firms employ 5 or fewer involving 14% of the people, while 3%, with over 50 persons, employ 30%. As with the other services, these are naturally located near production areas. The service area of a given firm, however, may be quite large.

Interview data are included from 51 of these firms. A wide variety of job titles are involved since the businesses are diverse in nature. About half of the employers interviewed listed only one or two year-around job titles, although many of these had seasonal employees. Even though the diversity does not allow job patterns to be determined, it is discernible that the emphasis of these businesses is in mechanized agriculture since many employ people to operate, maintain, and repair machinery and equipment. Seasonal jobs in these titles are present, although most are year-around.

Offices of Veterinarians and Animal Hospitals, 0722

The establishments in this classification are all under the supervision of a licensed veterinarian, with their primary purpose the care and treatment of sick or injured animals. While boarding may be included in 0729. A total of 897 establishment are listed in this category, and while they are widely distributed throughout the state, Los Angeles County has over 3 times as many as any other county. Other population centers are also high, with the normal agricultural production areas in the minority. Almost three-fourths employ 5 employees or fewer, and only 2 establishments listed over 20.

Thirteen of these businesses provide data from the interviews. Four of these listed only one job title, the veterinarian(s) himself. One or more veterinarian assistants were added next, with small-animal caretakers also being listed in the larger businesses.

Poultry Hatcheries, 0723

This category is composed of establishments engaged primarily in hatching eggs. The raising of poultry is classified in other SIC's. Since only 31 of these establishments are identified in California, the impact on employment is not extensive.

Animal Husbandry Services Not Elsewhere Classified, 0729

These businesses perform various services on a contract or fee basis. Services include animal breeding, animal training, cattle feeding, dog grooming, livestock auctioning, and similar activities. It is therefore a diverse group, though relatively small, listing 491 businesses. Distribution is widespread, but more are located in heavily populated counties than in rural counties. Most of these are small businesses, for 75% employ 5 employees or fewer, and only 1% have more than 50.

Interviewing was done in 26 firms, with heavy representation by cattle-feeding operations.

As an example of the job patterns in these feed lots, one listed the owner/operator, an operations manager, a business manager, a general foreman, one crew foreman, one repairman, ten livestock farm hands, one grain mixer, five livestock feeders, two office clerks, and ten seasonal livestock farm hands. Titles found in other businesses in this SIC include equipment operators and truck drivers, general farm hands, artificial inseminators, grooms, horse trainers, bookkeepers, lab technicians, and milk testers. Some of these jobs are seasonal, though only a small percentage, for 65% have no seasonal employees at all.

Horticultural Services Not Elsewhere Classified, 0731

Establishments in this category are engaged in such services as garden and landscape maintenance, landscape planning, tree planting and trimming, and similar activities. Businesses which combine these services with the growing of plants are included in 0192. Although 1,470 of these firms are listed, almost 80% hire 5 employees or fewer, and only 1% hire over 50. This is another classification with most of the businesses in counties with large populations, and only minimum representation in the more rural counties. As a specific example, almost 30% of these firms are in Los Angeles County.

Fifteen firms provide the interview data. The owner/operators are assisted by few workers in the smaller operations, and supervisory personnel are added almost as fast as landscape workers as the size of the operation increases. In other words, work crews appear to be small, each under the direction of a working crew or division foreman, with a general foreman or some other supervisory title in charge of a few crews. Used to designate the crew members are a variety of titles, such as landscape worker, landscape apprentice, or assistant landscper. A few truck drivers and equipment operators are involved, though it

appears that most of this work is done by the crew members or supervisory personnel, rather than specialists. Occasionaly listed is a professional such as a landscape designer or a landscape architect. Very few seasonal jobs were encountered.

Hunting, Trapping, and Game Propagation, 0741 and Fish Hatcheries, Farms, and Preserves, 0989

These two categories are considered together since they are somewhat related, even though not close in terms of the numbering system. Very few businesses are listed in these categories, and interviewing was done in only 3. Employment opportunities are negligible at present, even though indications are that 11 of the businesses in these categories, are increasing. Many however, are in conjunction with established firms in other categories, and workers do the tasks which might be involved in these categories as part of their other job.

Farm Labor and Commodity Associations, 0751-0761

Combined here into one group are several similar categories, all special for California. These are Farm Labor Associations, Other Than Citrus (0751), Farm Labor Associations, Citrus (0752), Farm Commodity Associations, Other Than Citrus (0753), Farm Commodity Associations, Citrus (0754), and Harvesting and Resale of Purchased Crops (0761). Even all together, only 117 of these associations are listed by the Department of Employment. Almost half employ over 50 people, accounting for 93% of the 10,000 employees involved. These firms are located in the areas of production.

Only 8 firms were involved in the interviewing. The predominant job types are farm hands, field hands, and harvest hands, accompanied, of course, by numerous supervisory jobs. Both year-around and seasonal jobs are represented.

Forestry, 0811-0861

All of the classifications involving forestry, the major group 08 in the manual, are grouped together for the purposes of the study. Individually, these categories are Timber Tracts (0811), Forest Nurseries (0822), Tree Seed Gathering and Extracting (0823), Gathering of Gums and Barks (0842), Extracting of Pine Gum (0843), Forestry Services (0851), and Gathering of Forest Products, n.e.c. (0861). This is a very small group for Califonia, with fewer than 50 firms listed and only 509 employees. These categories include neither firms devoted primarily to logging and lumber nor governmental agencies, the two big types of operations in forests. In addition, Christmas-tree farms, a growing business in California, do not employ many people. Consequently, this group is of little significance to employment in California, and interviewing was conducted in only 5 firms.

Manufacturing, Food and Kindred Products, 2011-2099

All of the food-manufacturing businesses were combined into one group. This makes a relatively large group of 1,696 firms having 165,346 employees. Not only is the group large, but the individual businesses are also large, for almost 90% of the employees are in firms which employ over 50 people. Many of these firms have little relationship to agriculture, and therefore have no personnel requiring agricultural competencies even though food and kindred products are manufactured.

Consequently, firms were contacted in this group who were not actually interviewed, since agricultural competencies were not required. A total of 82 firms did require such competencies and therefore contribute data to the study. Some of these firms are involved in production classification. In others, managerial personnel and others who come in direct contact with production are the only ones requiring agricultural competencies. Many firms have fieldmen who buy the raw material and advise growers about production practices as well. In these instances the need for agricultural competencies is obvious. Other firms feel that their salesmen must know production in order to represent the product properly. The variety of the situations encountered makes it impossible even to estimate the percentage of the 165,000 employees in this group who do actually need agricultural competencies. What can be said with certainty is that these businesses are not located on farms and that many of the employees do not need to know anything about agriculture, though the assumption cannot be made that none of them need agricultural competencies.

Manufacturing, Agricultural Chemicals, 2871-2879

This group includes establishment engaged primarily in manufacturing fertilizers, agricultural pesticides, and other agricultural chemicals. It is similar to other manufacturing groups in the need for agricultural competencies. Of the 4,303 employees listed by the 113 firms, need no knowledge of agriculture. However, employers interviewed in 14 firms indicated that some employees in their firms do. Listed in almost all cases again are field representatives and salesmen, as are mangerial and supervisorial personnel. In additon, many of these firms had employees who were involved with the application of chemicals, for whom production knowledge is as important as it would be if they were employed by the farmer.

Manufacturing, Farm Machinery and Equipment, 3522

This category is composed of establishments involved primarily in manufacturing machinery and equipment used in planting, cultivating, and harvesting agricultural crops, or for processing or treating agricultural products on farms. Other categories include the manufacture of other types of machinery and equipment. The Department of Employment listing contains 144 of these firms, with 3,528 total employees. Many of these are quite small, almost half having 10 employees or fewer, although over 2,000 of the employees are in the 18 firms employ-

ing over 50 people. No geographic area is predominant, for there are a few in many California counties.

Data from interviews in 14 of these firms are included in the tabulations. Foremen and mechanics are listed in almost all cases, and welders and salesmen are listed frequently. Agricultural engineers are common in the larger companies. Most of those listed are in a year-around jobs, although some seasonal jobs were encountered, especially for mechanics and welders.

Public Warehousing, 4221, 4222, 4223

Of several types of public warehousing, three were identified as possibly having some employees needing agricultural competencies. These were Farm Product Warehousing and Storage (4221), Refrigerated Warehousing Except Food Lockers (4222), and Food Lockers (4223). The official listing included 255 firms in these 3 categories, employing 2,956 people. Most are fairly small businesses in terms of employees, with over half having 5 or fewer, and only 8 employing over 50.

In the interviewing process, 14 were contacted who listed employees needing agricultural competencies. In addition to the supervisory personnel, the jobs listed most frequently were butchers and other meat-handling personnel. The category is not a major employer of agriculturally trained personnel.

Stockyards, 4731

Although stockyards employ people who need agricultural competencies, there are so few in California that very few employment possibilities exist. Only 3 were on the official listing, and interviewing was not conducted in any of them.

Electricl Companies and Similar Services, 4911 and 4931

Practically all of the employees in these two categories are in large companies, for 3,706 of the 3,846 employees are in the 8 firms employing over 50 people. Only 140 employees are in the remaining 13 firms. Although such companies do employ people with agricultural competencies, the number is quite small. Therefore, no interviewing was conducted in these firms, even though some agricultural jobs do exist.

Irrigation Systems, 4971

This category is composed of companies engaged in operating water-supply systems for the purpose of irrigation. A total of 125 of these companies are listed, but only 672 employees are involved. The category is obviously not the source of many jobs, although agricultural competencies are required. Six firms provide interview data, ranging in size from 1 employee to 40 year-around and 24 seasonal employees. Most commonly listed are water tenders, chemical-application equipment operators, and heavy-equipment operators. Listed occasionally are

weed control specialists, repairmen, and welders.

Wholesale Growers, Packers, and Shippers of Fruits and Vegetables, 5040

This special California category comprises those companies that grow, pack, and ship fresh fruits and vegetables. It is a very unusual category in that production personnel are included in an SIC that is among the wholesale and retail-trade classifications. Some of California's largest producers, of vegetables especially and of fruits to a lesser degree, are found here rather than in 0123 or 0122.

The listing included 401 of these firms, employing 23,262 people. The predominance of the large firm is indicated by the fact that 42% of the firms listed employ over 50 people and account for 85% of the employees in the entire category. The counties with the largest number of these firms are Fresno, Monterey, and Tulare. The other leading agricultural counties have almost all of the rest of the firms.

Interviewing was conducted in 30 of these businesses. Although 20% of the firms in which interviewing was conducted had only two year-around job titles, none had only one (as in many of the production SIC's). The largest firm listed 22 year-around titles, involving 162 employees, and two seasonal titles with 125 employees in them. As would be expected, several managerial and supervisorial titles are frequently listed in each firm. Equipment operators, tractor drivers, mechanics, and repairmen are involved in almost all cases, along with a few farm hands. Irrigators are also listed frequently as year-around jobs, with an occasional listing of such titles as fruit grader, packer, harvest hand, shed hand, and pruner. These latter titles are more commonly designated as seasonal, however. Additonal crew foremen are often employed seasonally, along with an occasional seasonal equipment operator.

Wholesale Distribution of Groceries and Related Products, 5041-4047

Combined into one group in the study were the wholesale distribution categories of Groceries, General Line (5041); Dairy Products (5043); Poultry and Poultry Products (5044); and Meats and Meat Products (5047). Other categories in this major group were not considered in the study at all. Listed in this group were a total of 927 firms, employing 20,951 people, with geographic distribution throughout the state.

Even though a large number of employees are listed in this group, not many require agricultural competencies. Interviewing was conducted in 18 firms where employers felt that such competencies were required. Managerial and supervisorial personnel were listed most frequently, along with a few butchers and truck drivers. Very few seasonal jobs were listed, except in one case where production was involved and harvest hands and fruit packers were included.

Wholesale Distribution of Fresh Fruits and Vegetables, 5048

This category is similar to the special California category 5040 except that it does not include firms which grow fruit and vegetables.

Even so, the category is different from other wholesale-distribution categories in that it includes firms with employees working on farms as harvest hands, packers, graders, sorters, and shed hands. Production personnel are not involved. The listing contained 657 of these firms, with 8,613 people employed in them. Firm size is not as large as in 5040, for only 6% employ over 50 people, while 55% employ 5 or fewer. These businesses are located throughout the state, with a heavy concentration in pouplation centers.

Data from interviews are included from 14 firms. The most frequently listed year-around personnel were managers, foremen, fieldmen, and salesmen and the seasonal personnel are the product harvesters and handlers mentioned above.

Wholesale Distribution, Farm Products, Raw Materials, 5051

This category is divided into four separate categories in the 1967 classification system: Cotton (5052), Grain (5053), Livestock (5054), and Other Farm Product Raw Materials (5059). Since the combined category includes only 190 firms, there seems little need for the division in California. These firms listed 3,216 employees, about half of them employed by the 2% of the firms having over 50 workers. Locations are throughout the agricultural areas of the state.

The interview data come from 10 firms, non of them large. Listed most frequently were supervisory and managerial personnel, with buyer and clerical titles the only others listed by more than one firm. This classification does not provide significant numbers of jobs for agriculturally trained personnel.

Wholesale Distribution, Farm Machinery and Equipment, 5083

Wholesale distributors of farm machinery and equipment are not numerous in California (only 115 are listed). These are distributed throughout the agricultural areas of the state, although Los Angeles County has the most. Only 7 of the firms employ more than 50 people, and only 2,698 people are listed in total.

Interviewing was conducted in 7 of the firms. Personnel listed most consistently were salesmen although mechanics, repairmen, managerial, and supervisorial personnel also appear commonly. The category is not a major source of agricultural jobs.

Wholesale Distribution, Machinery and Equipment Not Elsewhere Classified, 5089

This category was selected as one which might produce some people requiring agricultural competencies, for sprinkler systems were one of the types of equipment involved. When the listings were received, however, such was not the case.

Wholesalers Not Elsewhere Classified, 5099

This category comprises wholesale distribution of a wide variety of products, most nonagricultural. It must be included, however, since some farm products are included, such as agricultural chemicals, alfalfa, farm supplies, feed, flowers, flower bulbs, harness, hay, nursery stock, and seeds. Since selection by firm name was the only means available, names indicating an agricultural commodity were selected from the total list. In this manner, the statewide listing of approximately 1500 firms was reduced to 251, employing 3,159 people.

Interview data are included from 44 of these firms. Because of the variety of businesses involved, employment patterns are meaningless. Sales personnel, either field or store, are employed in practically every instance, as are managerial and supervisorial personnel. All other titles are listed by only a scattering of firms.

Retail, Hardware Stores, 5251

Establishments in this category retail the general line of hardware items. Needs for agricultural competencies are therefore not extensive. In rural areas, however, farm hardware and farm supplies are often a major part of the inventory, increasing the need for the store personnel to have agricultural knowledge. This is also true in urban hardware stores which handle an extensive line of garden supplies and equipment. In these instances, the personnel needs are similar to those in SIC 5969, farm and garden supply stores.

The Department of Employment listing had 1,180 firms in this category, with 9,452 employees indicated. The size of business is usually quite small for well over half of these firms (62%) employ 5 people or fewer, and only slightly over 1% employ more than 50. The number of these businesses which could profit from having employees with agricultural competencies is not known, but it should be considered as a possibility for employment in most communities. The geographic distribution is extensive.

Interviews were conducted in only 6 of these firms, so indications for employment are far from conclusive. There is little doubt, however, that the primary type of job possibility is for sales personnel. Other possibilities are mechanics, repairmen, and managerial personnel.

Retail, Farm Equipment, 5252

These firms are involved in the retail sale of new and/or used farm machinery and equipment, including tractors as well as attachments and smaller types of equipment. Only 404 of these establishments appear on the listing, involving 4,693 employees. Most are found in the primary production counties of the state, although more are listed in Los Angeles County than any other county. Almost 60% of the employees are in medium-sized businesses employing between 11 and 50 people, an unusual statistic.

Although not an exceptionally large group of firms, it is a noteworthy category in the nonfarm sector in that most, if not all, employees need agricultural skills and competencies. Interview data are included from 21 firms with job titles ranging in numbers from 1 to 16 and numbers of year-around employees ranging from 1 to 77. Practically every firm lists salesmen, either store or field, mechanics or equipment repairmen, and managers, including parts managers, sales managers, and service managers.The larger operations include specialized mechanics, partsmen, and mechanics' helpers and a few list welders and assemblers. A minimum number of seasonal jobs are encountered, such as general mechanics, specialized mechanics, and salesmen.

Retail, Hay, Grain, and Feed Stores, 5962

Firms in this category are engaged primarily in the retail sale of hay, grain, and feed, although other farm materials and supplies may also be a part of the sales. This category includes only 236 firms, employing 1,626 people. Approximately 60% employ 5 people or fewer, and only 1% employ 50 or more. The majority of the employees are in firms employing 6-30 workers. Surprisingly, many of these firms are in urbanized counties, with the more rural counties sparsely represented. It may be that the customer of the hay and feed store is now the person with recreation animals, with those in agricultural areas being replaced by a larger, more general type of business, or by a wholesale distributor.

Ten firms provide the interview data, none of which were large, 16 people being the most involved. Titles listed most frequently were salesmen, either field or store, with almost as many truck drivers listed, though by fewer firms. Managers were next in frequency, with foreman and buyer the only other year-around titles listed. Only one firm listed any seasonal personnel: 2 store salesmen.

Retail, Farm and Garden Supply Stores, 5969

Establishments in this category are engaged primarily in the retail sale of such items as seed, bulbs, nursery stock, fertilizers, insecticides, sod, farm and garden tools, and irrigation equipment. The growing of plants should not be included, although some may do this on a small scale in connection with their retail outlet. Not included, of course, are supermarkets or discount houses, even though their volume of sales of this type of item is large, since the primary business of such a firm is not garden supplies. There are 704 firms on the list, with 4,487 employees. Distribution is statewide, with both rural and urban areas well represented since the category includes both farm and garden supply stores. These firms are generally small (65% with 5 employees or fewer) and over 70% of the employees are in firms with fewer than 20 people, an unusually high percentage in these categories.

As would be expected, the 30 firms from which interview data are included were almost unanimous in their listing of sales job titles. The largest number were listed as store salesmen, with fewer field salesmen, and still fewer store clerks. A few fieldmen were listed when the sales personnel were identified "in store." Landscape workers

and nursery workers were frequently involved, along with a few tractor drivers, equipment operators, and truck drivers. Since some equipment is involved, mechanics are found in a few instances also. Supervisorial and mangerial personnel are also listed, though not as extensively as in some businesses since the firms are relatively small and the operations not extensively diversified. Seasonal titles are seldom listed.

This category, although not extemely large in either number of firms or number of employees is of importance for agricultural jobs since most of the personnel involved in these businesses require agricultural jobs since most of the personnel involved in these businesses require agricultural competencies. It should also be re-emphasized that personnel in these firms need agricultural knowledge just as much in urban areas as in rural areas, since that knowledge is just as important to giving proper service to an urban buyer of a garden fertilizer as it is to the buyer of a crop fertilizer.

Retail, Florists, 5992

There is doubtful value in including retail establishments engaged in the sale of cut flowers and growing plants but not growing them. There are at least two reasons for doing so, however: One, growing plants are included in the sales items, extensively in some instances, along with supplies and equipment. Second, floral design has become a popular course in the curriculum in many schools. A third reason might be the close relation of handling and care of cut flowers to growing flowers. The data from the 15 firms in which interviewing was conducted indicate that sales and floral design are the two job areas prevalent in these establishments. Since there are 1,000 of these firms, with 3,748 employees, the total job possibilities are obviously limited. In addition, most are small, for 80% have 5 employees or fewer. Still, job possibilities do exist, at least for some rather specifically trained individuals. These possibilities are most prevalent in urban areas, where the florists shops are concentrated, even though a few are found in all areas.

State and National Banks, 6022 and 6025
and
Agricultural Credit Institutions, 6131

Of little significance to an agricultural-education study is the fact that there are 347 state and national banks with 87,708 employees and 64 agricultural credit institutions with 565 employees. A very minute percentage of those employees require even a remote knowledge of agriculture. Even so, some bank personnel, such as fieldmen, loan analysts, appraisers, and managerial personnel, must have an extensive knowledge of agriculture. Therefore, interviewing was conducted in 19 such banks, primarily in agricultural areas, and the data from those interviews are included. A college education is required for almost all of the jobs in banking that require agricultural knowledge. Most banks have extensive training programs for their employees after they are on the job, but agricultural knowledge must usually be obtained prior to employment.

Lessors of Agricultural, Forest, and Similar Properties, 6515

Even though this category was included and 61 establishments were listed, the category produced no interviews indicating a need for employees with agricultural competencies.

Disinfecting and Exterminating, 7342

These firms are engaged primarily in disinfecting buildings and exterminating insects, rodents, and other pests. There were 4,672 employees listed in 402 firms, but little indication that agricultural competencies are needed. Interview data are included from 4 firms, but this category does not seem to provide employment for agriculturally trained personnel.

Commercial Research and Development Laboratories, 7391

These firms are engaged in research and development activities on a fee or contract basis. Agricultural research is included as one of the general types of research conducted. It was difficult to determine how many of the 209 companies listed did perform such research, however, and examination of them in total did not seem to hold much potential for data of significance. The data from interviews in four such firms indicate quite limited opportunities for agriculturally trained personnel.

Repair Shops and Related Services Not Elsewhere Classified, 7699

This category includes businesses engaged in a wide variety of specialized repair services. Included are blacksmith shops, farm machinery repair, harness repair, horseshoeing, and tractor repair, all involving agricultural competencies. It is another category where a selection could be made by title of business, so that not all the non-agricultural shops had to be sampled. Since this method does not provide a completely accurate listing, the list of 381 firms identified in this way is not complete. These are small businesses, with only 1,762 employees listed. Most of these firms employ 5 people or fewer. Most are in agricultural counties.

Nineteen firms were involved in the interview process, most with only 1 or 2 year-around job titles. Listed most frequently besides the owner/operator were welder and general mechanic. These titles were also listed in isolated instances as seasonal titles. Although not large, this is another category providing employment for agricultural students with mechanical training.

Amusement and Recreation, 7941-7949

Originally included in this group were Sports Promoters and Athletic Fields (7941), Public Golf Courses (7942), Riding Academies (7946), Golf Clubs and Country Clubs (7947), and Amusement and Recreation Not Elsewhere Classified (7949). The 7941 and 7949 categories proved un-

productive in terms of agricultural jobs, and were eliminated. The combination of the remaining 3 categories resulted in a listing of 417 establishments and 11,124 employees. Many of those employees, of course, need no knowledge of agriculture. Such knowledge is required only for those involved with the golf course and grounds or with the horses in the riding academices.

Data are included from interviews in 14 of the firms involving golf courses. Greensmen or general golf-course workers are reported in almost all cases. Tractor and equipment operators, mechanics, gardeners, and watering personnel are also listed frequently. Some type of managerial and supervisorial personnel are also listed in msot of these firms as needing agricultural competencies.

Golf courses are not usually thought of as being agricultural, but the knowledge required is similar, and the job opportunities exist, especially in urban areas. They should not be overlooked as potential employment locations.

Arboreta, Botanical, and Zoological Gardens, 8421

This is a category in which agricultural competencies are required. Employment opportunities are virtually nonexistent, however, since only 2 establishments are listed, each having only 5 employees or fewer.

Business Associations, 8611, and Nonprofit Member Associations, 8699

Both of these categories include associations involved in agriculture and therefore employ people needing agricultural knowledge. The large number of associations which are totally unrelated to agriculture, however, makes identification difficult and an accurate sampling impossible. Inteviews were conducted in ten 8611 firms and three 8699 firms which could be easily identified as having a connection with agriculture. These interviews confirm the need for agricultural information by personnel involved, but provide little data of use in terms of the job titles included.

Nonprofit Research Agencies, 8921

This category is similar to 7391 in that the potential is present for agricultural research, and therefore agriculturally trained personnel, but the relevant firms are undistinguishable. Since only 69 are listed, employment possibilities would not be great even if identification were obvious.

Government Agencies, Federal, 9100; State, 9200; and Local, 9300

A complete listing of government agencies would be quite extensive, even if only those employing agricultural personnel were included. No such listing was attempted, although data are included from 7 federal agencies, 22 state agencies, and 13 local agencies. Although the actual employment potential of any government agency varies in direct proportion to their always unstable budget situation, there is no doubt that jobs

requiring agricultural competencies are fairly extensive in government service. These jobs range from gardeners in the city park through professional agronomists in federal services, and should be examined as a major source of employment in all educational situations.

Miscellaneous Categories

In addition to interviewing in the SIC categories discussed above, an occasional interview was conducted in firms which were not classified in any of the selected categories. The listing is obviously not complete, but there is nothing to indicate that any significant number or type of job was overlooked by the selection process. If anything, time was spent examining classifications which contribute so little to job possibilities that they should not have been examined.

Included are data from interviews in individual firms in Sawmills and Planing Mills, General (2421); Industrial Machinery and Equipment (5084); Professional Equipment and Supplies (5086); Lumber and Construction Materials (5098); Lumber and Other Building Materials Dealers (5211); Fruit Stores and Vegetable Markets (5431); and Engineering and Architectural Services (8911). Interviewing was conducted in four firms in 6531, Agents, Brokers, and Managers.

APPENDIX C

JOB TITLES IDENTIFIED AND INTERVIEWED

PLANT WORKERS

026	Baler (Cotton)	2
048	Butcher	8
052	Candler	3
053	Caretaker, Small Animal	3
056	Cheese Maker	4
073	Cook, Cannery	1
086	Dairy Plant Worker	8
134	Feedmill Worker	4
136	Fertilizer Plant Worker	3
177	Ginner	4
179	Grain Elevator Operator	3
182	Grain Mixer	2
195	Hammermill Operator	7
229	Hydraulic Press Operator	1
254	Service Company Worker	3
264	Miller	2
265	Mill Sifter Operator	6
279	Packer, Egg	4
280	Packer, Fruit	12
281	Packer, Meat	3
282	Packer, Vegetable	5
292	Pelter	2
314	Poultry Cleaner	1
319	Poultry Picker	3
366	Sewer	1
377	Sorter, Fruit	7
397	Tallyman	3
402	Tieman	4
406	Trafficman	1
408	Traffic Man (warehouse)	1
435	Weighmaster	7
440	Yardman	1
452	Clean-up Man	4
454	Sheller Operator	1
462	Processing Plant Worker	30
472	Dehydrator Operator	3
474	Receiver	7
476	Warehouse Man	18
481	Sorter, Fruit & Vegetable	3
485	Pasteurizer	4
488	Hoistman	2
489	Sorter, Flower	1
291	Shed Hand	7
530	Sausage Maker	1
536	Boxmaker	2
		202

LIVESTOCK WORKERS (ANIMALS)

023	Auction Worker	3
024	Auctioneer	1
192	Groom	4
207	Herdsman	24
213	Horse Breaker	2
216	Horse Trainer	3
218	Horseshoer	2
263	Milking Machine Operator	52
317	Poultry Feeder	3
386	Stock Tender	2
425	Veterinarian Assistant	8
428	Washer (cow)	3
460	Horse Trainer's Helper	2
461	Assistant Herdsman	1
465	Feeder, Livestock	34
502	Caretaker, Large Animal	1
503	Veterinarian Intern	1
		146

TECHNICIAN & QUALITY CONTROL

015	Artificial Inseminator	3
137	Field Checker	9
143	Field Inspector	3
154	Forest Fire Technician	3
160	Forest Technician	1
166	Fruit Grader	4
235	Laboratory Assistant	3
236	Laboratory Technician	12
293	Pest Control Inspector	6
298	Plant Disease Control Specialist	
301	Plant Material Technician	3
322	Processed Product Inspector	4
330	Quality Control Grader	5
331	Quality Control Specialist	12
339	Research Aide	3
347	Sampler	1
359	Seed Analyst	3
361	Seed Inspector	1
362	Seed Techonologist	1
401	Tester Milk	3
422	Vegetable Grader	2
432	Weed Control Specialist	1
458	Field Technician	4
492	Engineering Technician	6
493	Conservation Aide	2
496	Assistant Ranger	1
		97

HAND LABOR (FARM)

009	Almond Knocker	1
095	Ditch Digger	2
126	Farm Hand, Crop	115
127	Farm Hand, Livestock	51
128	Farm Hand, General	26
130	Farm Hand, Poultry	12
140	Field Hand, Fruit & Nuts	9
141	Field Hand, General	5
142	Field Hand, Vegetable	7
197	Harvest Hand, Citrus	3
198	Harvest Hand, Fruit	8
199	Harvest Hand, Strawberries	3
200	Harvest Hand, Vegetable	11
230	Irrigator	91
307	Planter	1
430	Watermaster	4
431	Water Tender	2
442	Pruner, Fruit & Nut Tree	21
446	Thinner, Vegetable	3
497	Cultivationist	1
		376

EQUIPMENT OPERATION & REPAIR

035	Blacksmith	2
054	Carpenter	2
057	Chemical Applicator Equipment Operator	10
066	Combine Operator	1
075	Cotton Picker Operator	3
081	Cultivator Operator	2
110	Electrician	2
115	Engineering Designer	1
119	Equipment Designer	13
120	Equipment Operator, General	44
121	Equipment Repairman	13
161	Forklift Operator	15
186	Greaser	1
203	Hay Machinery Operator	7
206	Heavy Equipment Operator	19
253	Mechanic, General	100
255	Mechanic, Diesel	3
257	Mechanic's Helper	4
272	Mechanic & Truck Driver (=253)	3
287	Parts Man	7
289	Parts Manager	18
336	Repairman	32
365	Set-up Man	2
389	Sugar Beet Harvester Operator	1
407	Tractor Operator, General	120
414	Truck Driver, Delivery	13
415	Truck Driver, Route Salesman	3
416	Truck Driver, Livestock	2
417	Truck Driver, General	45
418	Truck Driver, Chemical Applicator	1
419	Truck Driver, Field Salesman	6
436	Welder	18
456	Mechanic Cotton Picker	3
457	Pump Installer	2
463	Aircraft Mechanic	3
473	Layout Man	1
487	Assistant Electrician	1
		511

LANDSCAPE NURSERY WORKERS

044	Budder	8
063	City Park Employee	2
146	Floral Designer	7
170	Gardener	7
176	Golf Course Worker	2
187	Greenhouse Man	3
189	Greensman	11
237	Landscape Architect	3
238	Landscape Consultant	1
240	Landscape Gardner	5
270	Nursery Worker	20
296	Plant Digger	2
326	Propagator	5
327	Pruner (shade tree)	1
410	Transplanter	1
413	Trimmer (shade tree)	1
453	High Climber	1
495	Landscape Apprentice	2
500	Assistant Greenskeeper	1
501	Assitant Landscaper	2
528	Landscape Worker	3
		88

	SALES PERSONNEL	
089	Delivery Man	5
092	Field Representative Salesman (=350)	4
144	Fieldman	39
346	Sales Manager	70
348	Sales or Store Clerk	11
350	Salesman, Field or Route	76
351	Salesman, Store	32
352	Salesman & Truck Driver	1
482	Assistant Field Representative	2
		240

	TIMBER-LUMBER LABOR FORESTRY	
404	Timber Cruiser	1
405	Timber Cutter	1
411	Trapper	1
498	Bucker (timber)	1
499	Faller (timber)	1
504	Forest Product Gatherer	1
505	Bearer	1
507	Chipper Operator	1
508	Debarker	1
509	Drop Sorter	1
511	Edgerman	1
512	Grader	3
513	Green Chain Operator	1
514	Millright	1
517	Planer Grader	1
518	Planer Man	2
519	Pony Operator	1
520	Resaw Operator	2
521	Saw Filer	1
522	Sawyer	2
523	Sorting Chain Operator	1
524	Spotter	1
526	Trimmer	1
		28

	OFFICE	
002	Accountant	21
038	Bookkeeper	60
047	Business Manager	14
094	Dispatcher	11
273	Office Clerk	48
274	Office Manager	121
275	Order Clerk	2
357	Secretary	67
455	Credit Manager	7
477	Assistant Bookkeeper	1
		352

	PROFESSIONAL	
005	Agricultural Market Specialist	3
006	Agronomist	6
010	Animal Inspector	3
013	Appraiser	14
022	Attorney	1
027	Banker	3
034	Biologist	3
041	Broker	3
050	Buyer	33
060	Chemist	13
067	Agricultural Commissioner	2
068	Commodity Investigator	2
069	Conservationist	2
070	Agricultural Consultant	4
078	Cotton Inspector	1
082	Culturist	3
107	Earth Scientist	3
113	Engineer	35
116	Enologist	1
118	Entomologist	7
123	Extension Specialist	11
125	Facility Inspector	1
145	Fish Conservationist	1
150	Food Technologist	1
157	Forest Products Technologist	1
158	Forest Ranger	11
159	Forester	14
164	Fresh Product Inspector	5
172	Geneticist	1
219	Horticulturist	1
250	Market Research Analyst	9
251	Market Specialist	1
259	Microgiologist	1
271	Nutritionist	2
285	Park Naturalist	1
290	Pathologist	3
295	Physiologist	1
324	Professor	1
372	Siliviculturist	1
400	Teacher	1
424	Veterinarian	18
483	Assistant Agricultural Commissioner	2
484	Assistant Enologist	1
527	Assistant Buyer	3
		234

	MANAGER, SUPERVISOR & FOREMAN	
018	Assistant Foreman	33
019	Assistant Manager	80
020	Assistant Superintendent	6
080	Crew Foreman	216
091	Director	14
097	Division Foreman	247
098	Division Manager	140
151	Foreman, General	220
249	Manager	260
300	Plant Manager	54
364	Service Manager	19
390	Superintendent	44
391	Supervisor	27
451	Personnel Manager	17
470	Field Superintendent	3
471	Propagation Superintendent	3
479	Production Manager	32
		1,425

	OWNER/OPERATOR	
011	Apiarist	3
029	Beef Cattle Raiser	12
031	Berry Farmer	2
059	Chemical Plant Operator	1
062	Citrus Fruit Grower	17
064	Cold Storage Operator	2
071	Contractor, Custom Field Work	1
072	Contractor, Farm Labor	27
076	Cotton Farmer	20
085	Dairy Farmer	50
087	Deciduous Fruit & Nut Grower	179
129	Farm Feed, Seed, Fertilizer & Insecticide Dealer	31
131	Farm Machinery Dealer	19
133	Feed Manufacturer	5
135	Feedmill Owner/Operator	1
138	Field Crop Farmer	78
147	Florist	11
149	Flower Grower	4
155	Forest Grower	2
163	Fresh Produce Dealer	30
165	Frozen Food Plant Owner/Operator	5
168	Game Bird Raiser	2
180	Grain Farmer	3

	OWNER/OPERATOR CONT'D	
184	Grape Grower (=87)	2
188	Greenhouse Owner/Operator	1
201	Hatchery Owner/Operator	1
215	Horse Raiser	8
239	Landscape Contractor	2
244	Livestock Farmer	7
260	Milk Plant Owner/Operator	3
261	Milk Products Distributor	1
268	Nursery Owner/Operator	21
269	Nursery Plant Grower	9
315	Poultry Farmer	15
323	Processing Plant Owner/Operator	27
337	Repair Shop Owner/Operator	17
340	Rice Grower	6
355	Sawmill Operator	1
360	Seed Grower	2
363	Service Company Owner/ Operator	57
373	Slaughterhouse Owner/ Operator	5
374	Small Animal Raiser	1
392	Supply Company Owner/ Operator	15
420	Turkey Raiser	3
423	Vegetable Farmer	50
448	Cattle & Swine Raiser	2
450	General Farmer	24
466	Feedlot Owner/Operator	5
467	Farm Equipment Manufacturer	6
468	Livestock Auction Owner/Operator	5
469	Meat Wholesaler	8
537	Bird Raiser (parakeet)	2
		811

MISCELLANEOUS

007	Agricultural Pilot	7
008	Pilot's Helper	2
077	Cotton Grader	4
100	Draftsman	2
109	Editor	1
245	Loader	5
328	Public Relations Specialist	3
338	Reporter, Market Representative	3
358	Seed Cleaner Operator	4
384	Statistician	1
393	Surveyor	2
427	Warden	1
464	Flagger & Loader	
475	Trouble Shooter	1
478	Loan Analyst	13
486	Systems Analyst	1
531	Water Analyst	1
534	Beeman (not owner)	1
535	Assistant Beeman	1
		56